This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

RC 60
H97

JP

Arnold Arboretum Library

THE GIFT OF

FRANCIS SKINNER
OF DEDHAM

IN MEMORY OF

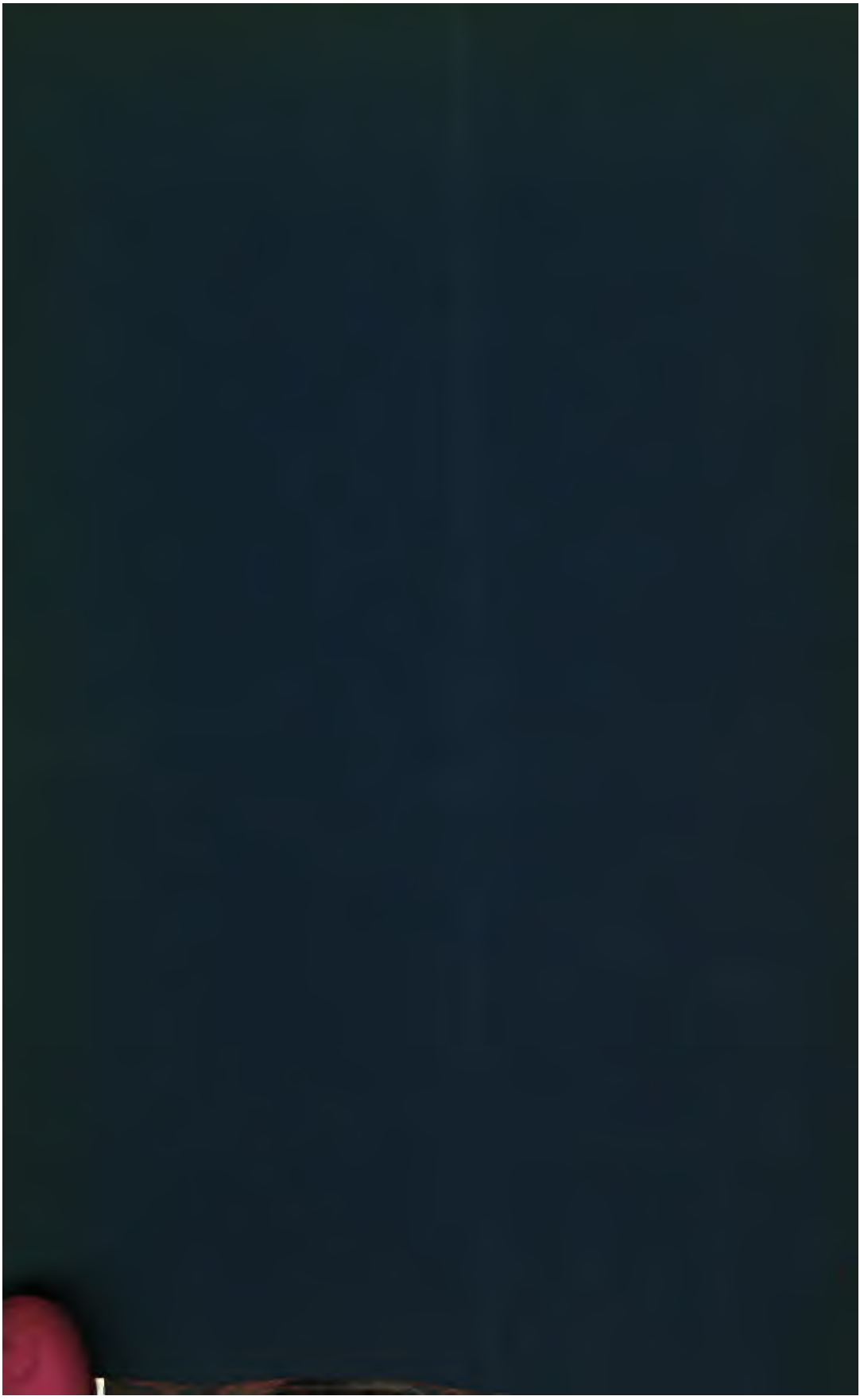
FRANCIS SKINNER

(H. C. 1862)

Received May, 1912.

TREE-PLANTING,

1899.



TREE-PLANTING,
1899.

A DESCRIPTIVE CATALOGUE OF THE BEST TREES TO PLANT IN CAPE COLONY, WITH BRIEF INSTRUCTIONS FOR PLANTING.

BY

D. E. HUTCHINS, F.R. Met. Soc.,
Conservator of Forests.
(Late Deputy Conservator of Forests, India, and School of Forests, Nancy, France.)

CAPE TOWN:
W. A. RICHARDS & SONS, GOVERNMENT PRINTERS.
1899.
A820.

May 1912
26332

FOREST TREE-PLANTING.

Preparation of the Ground.

In forming a plantation, the first and most important point to consider is the preparation of the ground. Unless this be carefully done the planting will certainly be a failure. It is useless to plant any trees until the scrub and indigenous vegetation have been eradicated. The simplest way to do this is of course to burn, plow, and cross-plow. This will cost about 30s. or £2 per acre, unless there are a good many roots to be got out. The plowing, except on sand, should be as deep as possible: and if one or two crops can be taken off the ground, it will be all the better for the planting afterwards.

In ground that cannot be plowed—hilly, stony, or full of roots—digging by hand must be resorted to. This is very expensive; but the cost may be reduced to £4 or £5 per acre by partial digging and throwing up the ground into ridges or mounds. When this is done, each sod as it is taken out with the spade is laid roots upwards on the adjoining ground. This kills both the vegetation in the sod and the ground covered by the inverted sod. Unless the ground wants draining, both the ridge and the hollow can be used for planting. If it does want draining, then only the ridges or mounds can be used. Mounds are best in marshy places, and then the higher they are made the better.

The same object, *i.e.*, the destruction of the indigenous vegetation, is obtained by digging shallow pits and throwing out the ground over the herbage around, the shallow pits being afterwards used for placing the young plants in. Shallow pitting with convict labour on the stony slopes of Table Mountain averages £4 per acre, spacing 4 ft. x 4 ft.

Higher up the mountain where the ground is too rocky even for shallow pits, the sods are simply turned over and seed sown on the inverted sod. Where the ground is both hard and dry, deep pits may be made, even up to a yard

cube of excavation. Such pits are very expensive and are only justifiable in special cases, such as for roadside trees where the first object sought is a rapid growth out of harm's way. In such a situation a pit of this size not only encourages root growth, but offers a valuable opportunity for manuring and improving the soil with road sweepings, old rubbish, &c. By the use of these big pits, trees may be successfully grown in countries where it is too dry for any trees to grow naturally. There the big pit of loose earth acts by inducing a rapid root-growth downwards to a depth where there is always sub-soil moisture. On this system watering is only required two or three times till the trees are established. Watering more than this is harmful, and tends to keep the roots at the surface and defeat the object of the big pit. Some years ago I planted over a million trees in yard cube pits. This was in a very dry hot country —Mysore, South India. And these trees came safely through the fearful famine years 1876-'77, when all the crops failed for want of rain, and even portions of the indigenous scrub died off. The big pit is a powerful aid to tree-planting; but in Cape Colony, where labour is costly, it can only be used in special situations such as avenues in towns where the extra tree-growth is worth the extra cost, or where the supply of water is limited.

Sowing.

In situ sowings of Wattle, Pine, or other seed should be put in with the first Autumn rains, or where there is a Summer rainfall, with the first good Spring rains. For sowing in the nursery, Spring is the best season, except in the case of certain succulent seeds such as Acorns, Walnuts, Chestnuts, &c., that do not keep well. These are best sown as soon as ripe. They should not be watered or encouraged to grow during the Winter. Those that do shoot can be protected from frost by a covering of fern, straw or other litter. Do not sow too deeply, either in the nursery or *in situ* (where the trees are to remain). All seeds require air to germinate; and if they are buried deep in the ground they will never come up. Heavy seed such as acorns should not be sown more than an inch below the

surface. Light seeds such as Gum seed should be barely covered with a thin sprinkling of sand; or, better still, with sand and sawdust mixed, and while germinating they should be closely shaded.

The quantity of seed that may be sown per acre for *in situ* sowings varies much. The rule in the large broadcast sowings of Cluster-pine on the Cape Flats is 40 lbs., or a good bushel to the acre. Where the conditions are less favourable than usual, 50 lbs. of seed to the acre is put in. For Saligna Wattle 20 lbs. of seed is usually enough, and where the seed and soil are good, and other conditions favourable, as little as 4 lbs. or 5 lbs. of seed to the acre is enough. No harm is done by sowing pines too thickly, but if sown too thinly the whole work must be done over again, or planting resorted to. Wattles, on the other hand, must not be sown too thickly as the bark on thin reedy stems is not worth stripping. It is almost always fallacious to take the average number of seeds to the pound and reckon that out in plants. Bad seed, birds, mice, drought, excessive rain, and often frost, have all to be provided for in varying degrees. Seed should not be wasted, but it is better to sow too much than too little. Too many young trees are a doubtful evil, and one that is easily met! Too few young trees—means, filling up with expensive planting or doing all the work over again.

Nurseries.

Preparation of Soil.—The special requirements of different trees will be found below, under the various trees described. Good garden soil should always be selected or prepared for a nursery, which is, in fact, a garden. Wood-ashes, burnt bones and well rotted compost are preferable to fresh dung. If dung be used, horse dung is better for heavy soils, cattle or sheep for light soils. If possible, store dung out of reach of heavy rain: 40 inches of rain will turn horse dung into fibre, only useful as a mulch. Use guano not at all, or cautiously: it is liable to produce too forced a growth and weak plants. The best manure of all for a nursery is the mud dug out of an unpaved stable. Backward plants may be brought forward by a dressing of this or by

watering with liquid manure, consisting of a few shovelfuls of dung thrown into a barrel of water. Liquid manure is also good for plants that have been too long in tins.

Pines and wattles require little or no manure: Gums a moderately good soil: Oaks and most leaf-shedders a better soil. Have a few beds specially prepared with a good dressing of lime or old mortar well broken up. Dig this in and reserve these beds for Walnuts and other trees that like lots of lime.

WATERING.—It is a common error to water a nursery too heavily. It should be kept moist but not wet. The appearance of moss and fungi is a sign of too much water being used: and when there is any suspicion of brackishness in the water watering must be kept down to the lowest quantity consistent with growth.

WEEDING.—The most economical plan for weeding and keeping the soil open is to set out the transplants in lines from 10 to 14 inches apart and run down the lines every two or three weeks with the Planet Jr. single wheel hand hoe. First transplants may be set 4 inches apart in the rows. The closer they are kept, without overcrowding, the cleaner and straighter will be their stems and the less the weeds.

SHADING.—All indigenous forest trees, the Camphor tree, and some others, do best under partial shade. Freshly sown seed, and freshly pricked out seedlings, should be completely shaded at first. One of the best methods of shading is the erection on posts of horizontal strips running N. and S., raised about 5 ft. above the tins or beds. This arrangement allows the morning and afternoon sun to enter, but stops off the hot noon-tide sun. These strips may be composed of planks, of bushes, or of roofing iron. The advantage of the latter is that it does not cause drip in rainy weather. For sown seeds light sacking or bush or grass laid on the ground is the best shade, but this must be carefully removed and examined *every day* and, as soon as the young seed peeps through the ground be replaced by higher shade. Unless the young seed can be carefully watched it is better not to incur the risk of shade laid on the ground.

SHELTER.—This is of the first importance in a nursery, especially where there is any brack in soil or water. Screens may be used as temporary make-shifts and potting sheds where both frost and high winds are to be feared. No time however should be lost in running up the complete shade of trees and hedges as soon as possible.

"DAMPING OFF."—This is due to a fungus called *Phytophthera omnivera*, allied to the potato disease. The root and the stem are at first quite healthy, but the seedlings rot away at the ground level and fall over in patches.

Young Pines are most likely to be attacked before they are pricked out. Late summer sowings which are sometimes necessary, suffer most. The disease spreads rapidly and creates fearful havoc. It is intensified by damp, dull weather, over-watering, or over-shading. The remedies are :

(1) Keep the plants as dry as possible.

(2) Take off all shade.

(3) Dig out the diseased patches at once and replace with clean dry sand. The diseased earth is full of spores : carry it away carefully to a distance from the nursery.

(4) To be safe next year have the seed tins or seed beds in some new and distant spot. The old nursery will remain infected with spores, but it is only crowded succulent seedlings that are liable to be attacked. For a full account of this pest see Marshall Ward's "Timber and some of its Diseases."

GENERAL.—Good and valuable seed is sometimes wasted owing to slow germination being mistaken for badness of seed. Ordinary tree-seeds—Gums, Wattles, Pines—take from ten days to a month to germinate, according to season and other circumstances. But Ash, both American and European, Pencil-cedar and Junipers generally, Lime, and others which have little interest for planters here, lie in the ground for nearly a year, and sometimes longer before they germinate. The Ash in Europe lies for two years in the ground before germinating, and it is usual to store it in pits with moist sand during this period. I have sometimes put

Ash and Pencil-cedar in tubs mixed with sand and kept moist, and then sown in the nursery beds as soon as visible germination began. The tubs must of course be carefully watched for the first signs of germination. But the usual plan with these slow germinating seeds is to sow early in winter, about May, and then to maintain the beds for two springs. The Juniper and Ash that have had all the cold and wet of winter on them will germinate largely the first spring and practically completely by the second Spring. The germination of some obstinate seeds may be hastened by macerating them for a day in water at a temperature of 100° Fah. in imitation of their passage through the intestines of birds. Hard seeds such as Wattle should be treated with boiling water and soaked in warm water till soft. Gums are usually sown in spring and planted out the following winter or spring, but with a little care they may be kept in the nursery a year longer. To do this, they should be cut back if large, watered sparingly, and the tins frequently lifted to make sure that the roots do not grow through the drainage holes. Pines may remain from one to two years in the nursery. I prefer two-year Pines grown in poor soil to one year Pines grown in rich soil. In a forcing climate like that of Knysna two-year Pines are too large to plant with safety. In the Cape Peninsula hardy two-year Pines about six inches high are the best for planting. Bed plants succeed well in the Cape Peninsula. Almost everywhere else in South Africa the hot winds render tin plants necessary, and in very dry localities planting from small single tins or reeds or metal tubes is the only safe way of planting with most species.

Hakeas, hedge-plants and all the quick-growing trees remain from six months to a year in the nursery. Slow growing trees remain two or more years in the nursery. The leaf-shedding trees usually remain for several years in the nursery, as they are so easily planted out as large trees. Oaks from six to eight feet high remain from five to seven years in the nursery.

Whenever it is necessary to store or pack succulent seeds, such as Acorns, Camphor, Chestnut, Walnut, or Juniper, mix the seed with an equal bulk of moderately dry earth. The earth shakes down between the interstices of

the seed and takes up little room, while at the same time its antiseptic and preservative qualities are enormous.

Planting out.

When the ground has been prepared as described above, by plowing or digging, it may be planted (1) with seed, (2) with seedlings, (3) with strong nursery plants. The first method is the cheapest, but it is the most uncertain. The third method is the dearest but the most certain. The second method shares the advantages and disadvantages of both, and is chiefly recommended in climates like the Cape Peninsula where the short wet season is barely long enough for *in situ* sowings to become established.

Seed.—Seed may be sown, as indicated above, broadcast, in drills, or in patches 3 ft. or 4 ft. apart. Sowing in patches or drills economises seed and facilitates weeding, but it takes more labour than sowing broadcast and harrowing. As a rule, only Pines and Wattles and Cape Cedar are sown direct.

Seedlings.—Sow in tins or beds from Spring to about Christmas; shade and water, as may be necessary, till Autumn. Then harden off by removing all shade and giving only enough water to keep the young trees alive. Prick out (in the ground where they are to remain) during rainy weather; one or more in each patch or pit. The best way to plant out seedlings is to make a clean cut with a spade, slip in the seedlings, 3 to each cut, and press the cut together with the foot. Seedlings cost less than nursery plants, since there is no handling in the nursery: and being smaller they are easier to transport. But their roots are weak and poor compared to those of a nursery tree once or twice transplanted; so that they develop less quickly and require more careful weeding and tending than nursery transplants. When seedlings are planted in rows and have their tap roots cut they become nearly as good as transplants.

Nursery Transplants.—This is the common method for nearly all trees. It is the easiest and most certain of success, but being the most costly it should not be adopted

on a large scale till the first two methods have been found to fail.

Nursery transplants may be put out (1) from tins; from pots; or from bamboo tubes, as in Australia and elsewhere; (2) dug out of beds without breaking the nursery clod; (3) open roots, *i.e.*, with the earth shaken off. (1) Is the safest and the method almost invariably adapted for evergreens that have to be sent any distance. A parafine tin split lengthways forms two flat trays into which from 12 to 25 transplants can be conveniently planted; 25 plants per tin is the usual number in the Government nurseries. A few specially large plants are raised in single tins—the half of a parafine tin cut crossways; (2) is only adapted for work near the nursery; (3) is the cheapest, but can only be practised with evergreens, when the winter rains are steady and certain as in the Cape Peninsula. It is the common method everywhere for leaf-shedders. The mud-bath for open root transplants is of doubtful utility; it is more important to carefully protect the roots from the drying action of sun and wind. The golden rule for all transplants is to disturb the roots as little as possible. Hence the utility of small tins and tubes for the most difficult planting.

Watering.—It is usually necessary to water young trees when they are first planted out. Watering afterwards will of course depend on circumstances. When watering has to be practised through the summer in hard ground it is best to pour the water into a hole prepared for the purpose at one side of the root. Make a small hole just wide enough for the hand to go into over the wrist and fill up the hole with leaves, weeds, or some other mulch. This plan keeps the ground open and the roots in their proper place, not too near the surface.

A common error in planting is to put the young trees in the ground too deeply. Nothing is gained by this except a liability to rot, if water stands about those green parts of the stem that should naturally be out of the ground. In planting out young trees they should stand at the same level as, or be only slightly deeper than, they stood in the nursery or tins whence they came.

For hand watering, it is convenient to make a hollow round each planted tree; but, if there is any danger of water standing in this hollow from irrigation or rain, as on the Cape Flats in Winter, then instead of making a hollow let each plant be on a small mound or ridge. Water standing over the roots will soon kill any tree, especially a freshly planted tree where the roots are more or less broken, injured, and delicate.

Size of Transplants.—The best sizes for transplants are:—

Pines	3 ins. to 5 ins.
Gums	8 „ to 1 ft.
Oaks and other leaf-shedders	6 ft. to 8 „

Sapling Oaks from a forest nursery are superior in every way to pollards dug out of old plantations. Their heads need not be cut off, and they have a well developed fibrous root system.

As long as trees remain in the nursery beds, transplanting must go on to keep the roots in a fibrous condition. A tap-rooted nursery tree is of little use. This is the reason why natural seedlings dug up from the forest and planted straight out are usually failures. The natural seedling has a long tap-root which is necessarily broken in getting it out.

The season for transplanting Oaks and other leaf-shedders is during Winter, before the buds show signs of opening.

Pruning for Transplanting.—In transplanting Gums and other evergreens, it is a good plan to remove all exuberant branches and reduce the leaf surface by about one-half, or even more, if hot winds are to be feared, as is the case with the berg winds at Knysna. The side branches may be removed from bushy young Pines, but that is all. No harm is done to Gums and most evergreens by pruning them back to a convenient size, but Pines cannot be so treated.

Cost of Planting Out.—The cost of planting will vary in every case, according to circumstances, but as a rough average the following figures may be taken for guidance:

Rough rule of cost per tree planted where the ground cannot be plowed and transplants are used.

Preparation of the ground, 3 *trees* per penny.
Nursery charges (average for various transplants.) do. do. do.
Planting out, weeding, &c. ... do. do. do.
or; 1 penny per tree planted.

This equals £11 6s. 10d. per acre for 4 ft. x 4 ft. planting. [It may be useful here to note that the cost of good fencing wire runs about *three* yards per penny.]

Mulching.

Every gardener knows that the ground about the roots of plants must not be allowed to become hard and caked. Watered trees in clayey soil are often killed by the hard crust that forms over the roots. To keep the soil open, porous, cool, and sheltered, there is no plan so good as "mulching," *i.e.*, making a little rubbish heap round the roots of each tree. Dead weeds, scrapings, sweepings, sawdust, or anything of a porous, open nature may be used.

Amongst fruit growers the dust mulch has come much into vogue during the last few years. The dust mulch, except with the most valuable trees, such as Cedars, is too expensive for Foresters. The dust mulch can not be employed with advantage where there are Summer rains, nor in windy localities. This necessarily limits its application in S. Africa.

Distance apart to Plant.

Inexperienced persons usually plant fruit trees too close, and forest trees too far apart. The standard distance for forest trees in Europe is one yard apart, the trees being put in square, one yard apart between the lines, and one yard apart in the lines. This gives 4,840 trees to the acre. This distance, within narrow limits, is the custom in all those countries in Europe where Forestry is understood and practised as an exact science. *Vide* my *"Journal of a Forest Tour." It is doubtless surprising

* "Journal of a Forest Tour," by D. E. Hutchins. Miller, Cape Town.

at first to reflect that a cabbage and a Pine tree should be planted at the same distance apart; but ignorance of this fact has prevented, more than anything else, the growth of good timber in Cape Colony. Planting as close as this will appear extravagant to many, but it is the cheapest in the end. To the weeds and bushy growth of the trees in sparse planting is added in S. Africa the danger from fire. Even in the case of parks and avenues, the trees, wherever possible, should be planted dense at first and thinned out afterwards. The natural home of the forest tree is the crowded forest where the tree has to struggle upwards to the light. If perfect trees (and not gardeners' bushes) are wanted, the only plan is to imitate Nature by planting dense at first and thinning out afterwards The advantages of dense planting may be summarized thus:—

(1) Shelter: from wind—the tree's greatest enemy; from too much sun; from drought; and from frost.

(2) A clean bole with natural pruning of the side branches, and clear timber free from knots.

(3) A straight gradually tapering bole, instead of a short, ill-shaped, and conical bole.

(4) An early closing of the crowns and killing down of the ground herbage. Till this point is reached, the weeds must either be continually removed at great expense, or the plantation left in imminent danger of burning. A strong growth of weeds will stunt the growth of the trees and frequently end by killing them.

(5) Not only does the clean soil of a close plantation minimize the danger from fire, but the absence of wind in a close plantation renders easily controllable such small fires as may occur.

(6) A slow steady growth and good fine-grained timber, instead of a rapid growth and bad coarse timber.

(7) Even-grained timber less liable to crack and warp on drying. Cut across sparsely grown timber and you will see it with thick yearly rings in the

middle and fine yearly rings near the bark. Cut across a log of timber that has been grown in dense forest when young, and you will see it of more even texture throughout.

(8) Early formation of the rich forest soil.

(9) The successive thinnings leave the mature forest formed of the finest "picked" trees only; thus, imitating nature, where the mature forest is formed of the tallest and strongest stems,—the survival of the fittest.

Trees that are certain to grow up rapidly, and close soon, may be planted further than 1 yard apart. Most trees, except Pines, on fair soil and where the weeds are not very troublesome, do well at the following distances:—4 ft. x 4 ft.; 4 ft. x 5 ft.; and even 5 ft. x 5 ft. Blue-gum—usually the fastest grower of all our trees—on good soil, succeeds at 2 yards apart, but this is about the outside limit for any trees in Cape Colony. Others, such as Jerusalem Pines and Rostrata Gums, do better if planted rather under a yard. The quickest growing Pines—Cluster and Insignis—should not be planted further than 4 ft. apart. In tropical countries, planting 3 yards apart will often give good results.

The number of trees per acre for any distance apart can be readily calculated, remembering that the side of the acre is 208·71 ft., say 209 ft.

The following are the exact figures:—

3 x 3	ft.	apart	gives	4,840	trees	per	acre.
3 x 4	,,	,,	,,	3,629	,,	,,	,,
3 x 5	,,	,,	,,	2,904	,,	,,	,,
4 x 4	,,	,,	,,	2,722	,,	,,	,,
4 x 5	,,	,,	,,	2,178	,,	,,	,,
4 x 6	,,	,,	,,	1,815	,,	,,	,,
5 x 5	,,	,,	,,	1,742	,,	,,	,,
5 x 6	,,	,,	,,	1,459	,,	,,	,,
6 x 6	,,	,,	,,	1,210	,,	,,	,,
7 x 7	,,	,,	,,	889	,,	,,	,,
8 x 8	,,	,,	,,	680	,,	,,	,,
9 x 9	,,	,,	,,	538	,,	,,	,,
20 x 10	,,	,,	,,	218	,,	,,	,,

Replacing Failures.

Never go on to new ground till the failures and blanks in the old plantations have been filled in. This is simply common sense, but no rule is more often forgotten in the haste to cover new ground and make a show of young trees.

Weeding.

Weeds must be kept down at any cost until it is quite clear that the planted trees are dominating and killing the weeds. As far as possible, the plow and scarifier, or horse hoe, should be used for weeding in place of manual labour. Their work will be facilitated by planting slightly out of the square, making the distance between the rows rather wider than the distance, from plant to plant, in the rows. This inequality must not be pushed too far, or the trees will be lob-sided. For instance, instead of planting 4 ft. x 4 ft. square, the planting might be done 5 ft. x 3 ft. But unless the weeding is likely to be very heavy, square planting is the best, or a distance, such as 4 ft. x 3 ft., that is nearly square.

The disposal of weeds is of some importance. If the scarifier be used, they should be attacked when quite young, ripped up and left to wither in the hot sun. With manual labour they have to be attacked later and less frequently. If unfortunately they are then seeding, and the locality one where weeds are troublesome, the only plan is to burn them and give the trees the ashes. But the better plan is to lay them round the trees so as to act as a mulch and keep down by their shade the growth of fresh weeds. The cost of weeding will vary from 4s. or 5s. per acre for scarifying, to, from 10s. to 40s. per acre for manual labour. Closely planted pines should not want weeding more than once, in sand not at all. Wide planting rapidly runs up a terrible bill for weeding and cleaning.

Pruning.

In close plantations pruning should be limited to removing one leader from forking trees. It is important that this be done as soon as possible. If it be omitted, the

tree will develop a mis-shapen bole, which will probably be split down the middle by the first gale. Sparsely planted and isolated trees require to be carefully pruned, often at considerable expense. In removing side branches, they should be taken off level with the trunk, a pruning saw being used first and a sharp knife afterwards. Small branches are most expeditiously removed by one clean cut, with any of the patent lever pruners such as that sold under the name of "Myticuttah." It is very bad to leave snags. In trees, such as Oaks, which are liable to hollowness in the trunk or in other trees whenever a large branch is taken off, the cut surface should be painted over with coal tar.

In tree-pruning this must be remembered. The trunk of a tree once formed increases every year in girth but never grows any higher. A sapling with the crown at 6 feet above the ground will never have a trunk longer than 6 feet unless the lower branches are destroyed or pruned off. In this case the sooner these lower branches are removed the less the shock to the tree. When the removal of a big branch cannot be avoided it is a good plan to shorten it considerably first, and take it off a year or two years afterwards. Caution and care are necessary in pruning. It should always be remembered that every leaf removed is, for the time being, so much growth lost.

Felling.

Trees that are intended to re-shoot, as in the case of a Blue-gum copse, should be always cut as low as possible, *i.e.*, at the ground level. This is "coppice"—one of the regular systems of forestry. Trees cut high up are "pollards," and usually offer the spectacle of young shoots on old decaying stumps. All the old Oaks in the Colony, almost without exception, have been pollarded at some time, and are unsound in consequence.

Pollard trees have their uses on farms, though even there they are tenant's more than owner's trees. But the indiscriminate lopping and topping of road-side and avenue trees had become a public evil in Cape Colony, and is now forbidden by Act of Parliament. Road-side trees cannot be

cut or pruned without the consent of Government obtained on application to the Forest Department. This rule applies to Municipalities, Divisional Councils, and all corporate bodies. The only road-side trees that may be pruned without the consent of Government are those on private property. *Vide* Sections 20—24 Government Notice No. 504 of 1889, Act No. 28 of 1888.

Winter is the best season for felling all kinds of timber. In frosty localities, however, Gums should not be felled in mid-winter, or the frost may kill the young re-shoots. Wattles are felled in Spring, as the bark is the principal product, and it then peels well.

Grouping of Trees.

In all plantations the grouping and mixing of the trees is an important point to consider. Oak rarely does well if planted alone with oak. In the forests of Europe it is the mixture of Oak and Beech that produces the magnificent Oaks we there see. The Oak, however, associates well with Pines, and since the Beech does not succeed in these latitudes we fall back upon the Pine, and plant Oaks and Pines together in our plantations. The Cluster-pine is the best for this purpose, but where that tree is too fast-growing for the Oak, Jerusalem or Canary pines may be substituted.

Again, the Pencil-cedar is perhaps the most valuable of all trees to plant here. But the seed of Pencil-cedar is dear and usually reaches us rather bad, so that young plants of Pencil-cedar are, for the present (till our own trees produce more seed) scarce and costly. But by mixing the Pencil-cedar with one of the cheap slow-growing Pines, such as Stone-pine or Canary-pine, and thinning out these as the trees grow up, the cost of the Pencil-cedar plantation becomes greatly reduced. A similar remark applies to Jarrah, Camphor trees, and many other valuable species. Mix them with some cheaper tree, that will shelter and carry them up, *without dominating them*, and then gradually thin out the inferior trees.

Bands or strips of quick-growing trees, with a dense covert, may be planted as protective fire belts. These trees when planted dense—3 ft. x 3 ft. or 4 ft. x 4 ft.—

speedily kill off all the ground herbage, and keeping the soil clean stop the progress of forest fires.

A mixture of Pine and Wattle is commonly seen on the Cape Flats. Nothing could be worse. At first the Wattles dominate and kill the Pines: then a few Pines struggle through the dense covert of the Wattle bushes and begin to dominate and kill the Wattles; at the same time showing in their own form all the evils of the sparsely grown or isolated tree. *Vide* page 11.

Certain trees, such as some of the Gums and Cypresses, take a fairly presentable form when grown alone. Others, such as the Jerusalem Pine, the Rostrata Gum and the Macrocarpa Cypress, must be kept closely packed when they are young and thinned out very cautiously afterwards.

In these matters the practical man's best guides are his own eyes. The tree planter should make up his mind before he starts planting; not only what trees and where he is going to plant, but how, viz.: in what manner his trees can be grouped to the best advantage. This may be remembered. That till we know more about Forestry in S. Africa, it is safer to lay down pure than mixed plantations. Much disappointment has been caused in S. Africa by attempting mixed plantations, or by allowing an originally pure plantation to get mixed in replacing failures or filling up vacancies. In Forestry all species are classified into two groups:—(1) Light-demanders; (2) Shade-bearers. A good mixture would be one where the light-demanding species were quicker-growing, and thus would early dominate the shade-bearing species.

Thinning.

To thin a plantation too severely is nearly as bad as to plant it too sparsely. A plantation too much opened by thinning will soon begin to show the evils enumerated above under sparse planting. As a rule, plantations in the Colony are either thinned too severely or not at all. The latter is the less evil of the two.

Various trees and varying circumstances demand different thinning. It is best to take advice or conduct careful experiments oneself. The only general rule that can be

laid down is to thin very lightly till the full height-growth has been reached, taking out only those stems that are manifestly suppressed by their stronger neighbours. If this be not done, it is generally of little consequence, beyond the loss of the market value of the dominated stems. But when the full height-growth has been reached, thinning becomes imperative, and the plantation should then be gradually opened out till large well-developed crowns are secured. In this process all the weak crowns and crowded stems are gradually removed. The golden rule in thinning is never to cause a permanent gap in the leaf canopy. As long as the leaf canopy is preserved unbroken, there will be little loss in the production of wood. Experiment has shown that a Blue-gum plantation, as long as the ground was completely covered by the crowns, produced the same increment of wood with 50 as with 500 stems per acre?

Leaf-shedding Trees.

Deciduous or leaf-shedding trees are usually easier to rear and easier to plant out than evergreens. Some, such as the Poplars, Willows, Plane, Catalpa and Ailantus, only require slips to be placed in the ground in Spring to produce trees in a few years. Trees the size of a man can be shifted with little risk during Winter, when the leaves are off. But leaf-shedders are usually natives of countries with cold winters, where the frosts disintegrate and enrich the soil, and they do not succeed in the poor soils where Wattles and most of the Pines and Gums flourish. In S. Africa they usually grow best where the winters are most pronounced, *i.e.*, the S.W. districts and inland at some elevation.

The changing of their foliage, their Autumn tints, and fresh beauty in Spring after the short Winter, combine to render them favourites in a country where the native vegetation is evergreen, and dull with the monotony of changeless beauty.

I shall only mention those leaf-shedders that are hardy over considerable areas in S. Africa.

Hedge trees and shrubs must be included here on account of the valuable shelter from wind afforded by hedges to nurseries and young plantations.

Hedges.

It is well to trench and, on poor soil, to manure the ground before putting in a hedge. And of course it must be kept well-weeded till the hedge can grow up and dominate the weeds. Hedges may be set out in a single row or in two rows, about 2 ft. apart. Usually the single row answers every purpose. The young hedge plants may be put in six inches apart in the rows in the case of Kei-apple, Australian-myrtle and Quince, and a foot apart in the case of Hakeas and the larger hedge plants. If only shelter be required, then a row of Wattles is the cheapest and most effective hedge—*Acacia cyclopis* or *A. saligna.* Of course many other shrubs and trees such as Blue-gum, Oak, and even Pines, besides those mentioned above, can be put into hedgerows, but they require much trimming and training, the disadvantage attaching more or less to all live hedges.

Frost and Drought-bearing Trees.

The following is a list of trees that will best stand the cold and drought of the Karoo and the country beyond:—

Virginia Pencil-cedar.
Robinia.
Tamarisk.
Deodar.
Common Cypress.
Pomegranate.
Jerusalem-pine.
Almond.
Cypress of various sorts.
Juniperus excelsa.
Weymouth Pine.
Oak—Turkey.
Olive—European.
Poplars of various sorts.
Catalpa.
Chestnut.
Cluster-pine.
Elm.
Eucalyptus coriacea.
,, amygdalina.
,, Gunnii.
,, rostrata.
,, viminalis.
Fig—common.
Insignis-pine.
Stone-pine.
Walnut.
Wattle—saligna.

This list might be largely extended with trees from Central Asia and the drier central States of N. America, notably Texas.

GOVERNMENT AID TO TREE PLANTERS.

In order to encourage tree-planting, seeds, and plants, or cuttings of forest trees and hedge shrubs are issued at cost price from the various forest nurseries:—at Tokai, near Cape Town; at Ceres Road, on the Western line; at Fort Cunynghame, on the Eastern line; at Knysna, &c.

Prices range from 2/- or 3/- per 100 for Gums, Pines and common trees to £5 per 100 for larger trees of valuable kinds. The price of seed ranges from 3d. a pound for Pine and Wattle seed to 30/- for some of the more valuable Gum seeds. Most of the Gum trees have seed as fine as dust, so that a pound of seed represents a very large number of possible trees. Of the larger seeds, a muid sack weighs:—

	lbs.
Acacia cyclopis (with arils)	100
,, decurrens	184
,, pycnantha	180
,, saligna	200
Acorns (Cape)	147
Cluster-pine	130
Pencil Cedar (Virginian)	68
Stone-pine	160

1 muid of Cluster-pine cones gives about 7 lbs. of seed.

Detailed lists of seeds and transplants are published yearly and may be obtained from all Forest Officers and most Civil Commissioners.

Advice or practical instruction on any point connected with tree-planting can be obtained on application to the nearest Conservator of Forests, and in order to avoid disappointment it is recommended that this course be followed in all cases of doubt and difficulty.

MUNICIPALITIES AND DIVISIONAL COUNCILS.

Under Act No. 4 of 1876, Divisional Councils and Municipalities may recover from Government one half of their expenditure on tree-planting within a yearly limit of £250 Government contribution. Applications for grants under this Act should be made to the Secretary for Agriculture, Cape Town.

All such aided trees, and all roadside trees not being private property, are specially protected under the Forest Act; and may not be removed or cut in any way until after permission has been obtained from the Forest Department.

POWER TO STOP TREES BEING FELLED.

Under Section 30 of the Forest Act No. 28 of 1888, any person who sees a tree being cut which is not on private property may appeal to the nearest Police, Forest or other Officer, who have power under the Forest Act to *then and there* stop the cutting of the tree, if the person cutting cannot produce good authority for doing so.

A private person may also be authorised under the Forest Act to act in the same way as a Forest or Police Officer, to prevent trees being unlawfully felled.

Under Section 31. When there is reason to believe that a forest offence has been committed, the wood or other forest produce may be seized by a Forest or Police Officer.

Under Section 35, trees of which the ownership is doubtful are to be considered Crown property until the contrary is proved.

Further information regarding the trees in this catalogue and others that there was not space to mention here, will be found in the following works:—

"Notes on the Commercial Timbers of N. S. Wales," by J. H. Maiden. Government Printer, Sydney, 1s. 6d.

"Select Extra-Tropical Plants," by Baron Sir F. von Mueller, Melbourne, Australia.

"Forest Flora of N.W. India," by Sir D. Brandis.
"Forest Flora," by Prof. Mathieu. (Treats of European and Algerian species.)
"Forests of North America," by C. Sargent. Census Office, 1884.
"Reports of the Californian State Board of Forestry."
"Journal of a Forest Tour," by D. E. Hutchins. W. A. Richards, Cape Town.
"Wattles and Wattle-barks," by J. H. Maiden. Chapman, Sydney, Australia.
"Useful Native Plants of Australia," by J. H. Maiden. Trubner & Co.

The above works relate to the growth and cultivation of trees likely to succeed in S. Africa. For general botanical reference a useful small work is Lindley & Moore's "Treasury of Botany."

The following Catalogue refers solely to Forest trees planted for timber, shade or ornament, and to hedge shrubs. Fruit-growing is only incidentally touched upon.

Aberia cafra. **KEI APPLE.**

A native of the Kei Valley and warm country beyond, but hardy under cultivation along the whole southern coast, where it is deservedly popular as a hedge plant. Grows badly at Ceres Road: luxuriantly under the greater warmth of Clanwilliam. A native of a warmer climate, it is generally somewhat slow-growing in Cape Colony, taking from three to five years to form a good hedge. But if carefully planted and kept clipped, it forms a hedge lasting for many years and quite impenetrable. Latterly it has been coming into use in Australia as a hedge plant. Young plants are raised without much difficulty from seed. The "Kei-apple" so-called, is a sweet fruit with a mawkish taste, useful, however, for preserving; its yellow pulp furnishing a clear light-coloured jelly of delicious flavour. The Kei-apple has been aptly termed the "Black-thorn of the Cape." Its value as a hedge shrub lies in its hardy

and sturdy growth. Once established it wants little water. It has the great recommendation that cattle will not eat it. An ounce of seed averages 560 grains.

Acacias: THE TAN WATTLES.

The species commonest in Cape Colony are arranged according to their value for tan bark, thus:—*Acacia pycnantha*, *Acacia decurrens*, *Acacia saligna*, *Acacia cyclopis*. The first on the list yields absolutely the most valuable bark: the second averages bark nearly as good (Natal), and it produces nearly double the amount where both grow well: the third is the so-called "Port Jackson" of the Cape peninsula, the mainstay of Cape tanners, and a bark that often analyses as well as either of the others. The last, the "Port Jackson" of the Eastern districts, has no practical value for tanning. All grow readily from seed, provided the seed has been scalded and soaked in warm water for 2 or 3 days. Boiling water for a short period will not injure the vitality of the seed. The seed should be soaked till it swells to double or treble its size and becomes soft enough to be crushed between the finger and thumb. Where seed is scarce or the locality unfavourable, wattles may be raised in tins, but it is almost always better to sow the seed *in situ*, *i.e.*, where it is to grow up into trees. From 5 lbs. to 10 lbs. of seed per acre is usually enough, but more seed, up to 40 lbs. to 50 lbs. per acre, may be sown in difficult places, such as sand-drifts, wind-screens, or hard gravelly soils.

The great merit of the wattles is, that they will grow on poor, sandy and sour soils, too sterile even for pines; and that they give a return in from 5 to 7 years. *Acacia decurrens* prospers on the poorest mountain land too "sour" to grow Gums. The present value of wattle bark, though better than it was, is still low, so that caution should be exercised in laying out plantations where the bark alone (and not the firewood as well) may have a market value.

Spring is the best time for stripping wattle bark. It is better to make a cut and tear off the bark down than up, as the bark near the root contains the most tannin. The bulk and quality of the bark is increased by making slits

downward with a knife some years before the bark is stript. Granular bark is liked better than fibrous bark. Wattle bark must of course be thoroughly dried before being packed and despatched. Drying sheds for the bark are therefore necessary in those parts of the Colony subject to late Spring or Summer rains. Bark well stored in a dry place increases slightly in tannin percentage.

Curiously enough the figure " 5 " is the Wattle-planters' golden number. It supplies nearly all his working data :—

Seed costs, per lb.	5d.
Quantity of seed to sow per acre ...	5 lbs.
If plants are used a good planting distance is	5 ft. x 5 ft.
Acacia decurrens and *Acacia pycnantha* should grow in height per year about	5 ft.
Bark stripping should begin in ...	5 years.
When the diameter of well-grown trees of the above kinds should be	5 inches.
Safe estimate of yield of bark per acre	5 tons.
Worth per ton about	£5.

Every Wattle-planter should obtain a copy of "Wattles and wattle barks," by J. H. Maiden, Chapman, Sydney, Australia.

Hopkins' Australasian Bee Manual arranges the common Wattles in the following order for bee fodder :—

Acacia lophantha.
,, *decurrens.*
,, *dealbata.*
,, *pycnantha.*
,, *longifolia.*
,, *melanoyxlon.*

Acacia saligna is valuable not only for bee fodder, but in its profuse seeding for feeding fowls, and its young shoots form excellent grazing for all animals.

The common Wattles mature in from 5 to 10 years.

Acacia cultriformis. **CULTRIFORMIS WATTLE.**

A bushy ornamental Wattle of no value for bark. It has a small prickly leaf shaped liked the coulter of a plow. It bears a profusion of yellow flowers like the golden Wattles, and being a small shrub is more suited for garden culture.

Acacia decurrens. **BLACK WATTLE.**

Prof. Maiden distinguishes four varieties of this valuable species merging one into the other, and all equally valuable for bark. Foresters will perhaps more readily classify them under two types:—

(1) The open-leaved.
(2) The close-leaved.

The variety that has been so largely grown in Natal belongs to the closed-leaved type and is termed *mollis* or *mollisima.* This has the widest range in Australia and is that which is most generally useful for planting in South Africa. The Black-wattle has a feather-leaf, somewhat resembling the Cape Keur. Till lately it was so badly attacked by the Dorthesia that it was useless to plant it in the Cape Peninsula. The advent of the Vedalia has rendered it possible once more to plant the Black-wattle. On the barren Knysna moorland it grows with a vigour surpassing that of every other tree. Knysna bark yielded 21 per cent. of tannin. The analyses of Natal bark are good—*vide*, "Wattle Bark a Paying Industry, by G. M. Sutton, M.L.A.," Davis & Sons, Maritzburg. In Australia *A. decurrens* bark assays from 15 to 54 per cent. of tannin. The average of 22 analyses was 32 per cent. (Maiden).

A. decurrens is the best Wattle to plant at some distance from the coast, especially in cool mountainous situations. It grows luxuriantly on the poor moorland of the mountains known as "Zuurveldt." A full-grown tree should yield about 1 cwt. of bark. A big tree will yield up to half a ton of bark. Trees 60 feet high and 2 feet in diameter have been cut in Australia. In buying seed care must be taken to secure the true black Wattle and not the silvery white *A. dealbata*, which is of less value for

tanning purposes (22 per cent., Maiden), but which in some situations is the more vigorous grower. At Knysna the two species grow with equal vigour. On the Nilgiris, in South India, *A. dealbata* when introduced ran wild with great rapidity, and has had to be eradicated from gardens, &c., at considerable expense.

While *A. Pycnan'tha* is practically confined to South Australia, *A. decurrens* is widely spread throughout all the cool regions of Australia and Tasmania. The great bulk of the "mimosa" bark that has been so largely exported from these countries is from this species. It is found as far north as South Queensland, but there the bark is inferior. The best bark comes from Tasmania, yielding a tanner three or four liquors when a more northern bark may yield only one. It is a common belief amongst tanners that the richest bark of all comes from trees that have grown amongst the frost and snow of high mountains.

At Knysna where *A. decurrens* and *A. pycnantha* have been planted together, the former is a hardier grower than the latter, and stands wind better. Indeed, *A. decurrens* contents itself with the poorest soil, and runs up rapidly to a tall straight tree—like a Gum, except for its delicate feathery foliage. A disadvantage of *A. decurrens* is its liability like other Wattles (usually, however, only in scrub forests) to run into small stems. On the other hand in favourable localities it grows to the dimensions of a timber tree, reaching 2 and even 3 ft. in diameter.

The maximum growth at Knysna has been 24 ft. in height and 4 inches in diameter in 3 years, the average of the plot being about $\frac{2}{3}$ of this. Various gums on the same soil and planted at the same time average only $\frac{1}{3}$ the growth. At Johannesburg it runs up at first faster than the Blue-gum and in two or three years becomes a good-sized tree. In the Government plantation at Ceres Road, it grows faster than any other tree that has been planted and yields the quickest and best return. In the Cape Peninsula the growth is generally poor. At Fort Cunynghame and in the cooler moister parts of the Eastern Districts generally it shows an excellent growth. The Black-wattle furnishes a useful firewood and small timber of medium density. Sleepers of this wood are to be tried in Natal,

and there is little doubt that when creosoted they will answer well enough.

For planting on mountain farms the Black-wattle has these three great advantages:—

(1) As it grows directly from seed sown on ploughed ground the cost of forming a plantation is less than where young trees have to be planted.

(2) The very rapid growth during the first two or three years enables it to dominate and suppress the weeds at once. This is a great advantage on mountain ground where the weeds grow so rapidly.

(3) The bark from the thinnings should repay the cost of the whole plantation in five years.

In the Black-wattle S. African tree-planters have no doubt one of their most valuable trees. Its oft-repeated sweet-scented cream-coloured flowers and delicate, almost fern-like, foliage, combine to render it one of their prettiest trees. It flourishes in most parts of S. Africa, but should not be planted on low, hot coast lands, nor inland where the drought and frost are severe.

The seed, which formerly cost 5s. or 6s. a pound, is now obtained from the Government plantations and sold for 6d. a pound. A pound contains about 28,000 seeds.

Acacia cyclopis. CYCLOPIS WATTLE.

The Rooikranz of the Cape Flats, at one time it was called *glaucophylla.* The common Port Jackson Willow of most parts of the Colony. Easily recognized by the prominent scarlet aril or seed thread. Of little or no value for tan, but a very vigorous grower. It was largely used by the Forest Department in arresting the drift sands at Durban Road, and has run wild at Mossel Bay, Humansdorp, Port Elizabeth, and various other districts in the Colony. At these places it takes its place among the indigenous shrubs, and is being rapidly spread by birds, &c. This Wattle should not be planted where the more valuable kinds can be grown, nor indeed near them, for it is very hardy, and is liable to

spread itself at the expense of the better Wattles. It seeds profusely. The soaked seed has a sweet scent. 1 ounce averages 387 grains.

Acacia implexa. **IMPLEXA WATTLE.**

This is also called the "late-flowering white" Wattle; from its bearing white instead of yellow flowers, and having these flowers in the middle of Summer instead of in Spring. It is of mediocre tan value, but is sometimes planted for its flowers. It is hardy at Tokai. It has a general resemblance to the *Pycnantha Wattle*, with, however, rough bark.

Acacia longifolia. **LONGIFOLIA WATTLE.**

A widely-spread Wattle, with many different varieties in Australia, and a Wattle that is completely naturalized on the Cape Flats, Sir Lowry Pass, and other localities in S. Africa. It is usually found bordering streams and in moist localities. One variety grows into a bush of an enormous size. Its handsome yellow flowers have given it the appellation of "golden wattle." Its bark is poor in tannin, and it is scarcely worth planting as a tan Wattle, but where it occurs naturally the bark is worth taking off, and is utilized for some of the finer kinds of leather.

Acacia lophantha. **LOPHANTHA WATTLE.**

This is a weed, in the sense that the bark is useless for tanning, and that it only grows on good fertile ground that could be better occupied. Common in the Cape Peninsula, also at Madeira.

Acacia melanoxylon. **BLACKWOOD.**

A valuable forest tree of Tasmania; common on river flats in Australia. Wood, dark-grained, not too heavy; used for furniture and a variety of purposes. Very handsome when polished. A partial shade-bearer, and precious to Foresters in S. Africa for this reason. This tree was for many years a favourite in S. Africa, but the ravages of the

Dorthesia have destroyed it in many places. The advent of the Vedalia has restored the Blackwood to our list of useful trees to plant. It succeeds best in cool mountainous situations and on moist, even boggy soil. *It is specially a tree that does well on the sour veld of the mountains and moorlands.* It is one of the few planted trees that has proved hardy on the poor washed-out, peaty, soil, on the top of Table Mountain. On the Nilgiri mountains, S. India, it had an acre-increment of 6 tons (dry wood) per year—half that of the Blue-gum. It was more shade-bearing than the Blue-gum. Do not plant the Blackwood (as has often been done) in hot, dry situations. 1,440 seeds go to the ounce.

Acacia pycnantha. PYCNANTHA WATTLE.

This is the Wattle with thick broad leaves (*phyllodes*) and a profusion of beautiful yellow flowers from which the name "Golden Wattle" is derived. It assays from 15 per cent. to 46 per cent. of tan. The average of 20 analyses was 34·4 per cent. (Maiden). A sample grown on fair soil at Tokai yielded the somewhat disappointing result of 27 per cent. of tannic acid. A sample of young bark from Knysna yielded 25 per cent. of tannin.

It succeeds best in warm dry localities near the coast: and, on a loam or sandy-loam, runs up rapidly to a small tree about 30 ft. high. On nearly pure sand the growth is uncertain; sometimes slow, and sometimes almost nil, as on the rocky slopes of Table Mountain above Woodstock. Perhaps it may average about one-half that of *A. saligna* in the Government plantations on the Cape Flats. In the barren Knysna moorlands it grows well. The growth there is so rapid and vigorous that during the first two or three years it surpasses that of the Blue-gum and is nearly equal to *Acacia decurrens.*

The Pycnantha Wattle requires from moderate to heavy winter rains and a loamy soil. We see it flourishing with from 30 to 40 inches of rain at Wynberg and at Tyger Hoek in the Caledon Division. In the Caledon Division it seems to be at its best, growing there with great vigour, a strong natural reproduction and often with but a scanty rainfall.

Here no doubt the climate most exactly reproduces its S. Australian home. At Tyger Hoek and Ceres Road it comes up everywhere like a weed. In the Government plantation at Ceres Road there are some successful *in situ* sowings and more seed is produced than can be utilized. Formerly imported Australian seed used to cost not less than 5/- per lb. Now it is sold from the Government seed store at 4d. a pound, the bare cost of collection. It seeds freely at 8 years.

At Johannesburg, Natal, and other places with summer rains the Pycnantha Wattle does not succeed.

This wattle, the most valuable of all the tan bark wattles, has been so little grown in South Africa that it may be well to add a short description of the tree as it occurs in Australia. There, its home is South Australia. It is seen at its best on the hills around Adelaide, and (adds Prof. Maiden from whom these details are obtained) people should be careful to obtain seed from there. It does not succeed above 2,000 ft. elevation in South Australia and is easily injured by frost. It likes a warm climate and a moderate rainfall. Mr. J. Ednie Brown, the late Conservator of Forests in S. Australia, thus describes the typical form :— Height 20 to 25 ft. Diameter 6 to 10 inches. Average life 10 to 12 years. It lives longer in sandy than in clayey soils. It should be stripped from the 6th to the 9th year according to circumstances. Stunted trees from dry localities have a very poor bark, analysing as low as 15 per cent. of tannin. On poor sandy soils the bark averages about 25 per cent. of tannin; on mixed sand and loam from 30 to 40 per cent. Mr. Brown has grown it successfully with a rainfall as low as 10". Prof. Maiden thus describes a 46 *per cent.* sample analysed by him :—It is smooth, a model of compactness, contains a minimum of fibre and therefore powders splendidly, it is of good colour and an excellent bark in every way. South Australia has practically the monopoly of this bark, and it is a grand heritage—the envy of the Eastern colonies.

Mr. Ednie Brown recommends planting *Acacia pycnantha* at a distance of 4 to 6 ft. from plant to plant. He assumes 1,000 trees per acre to yield (at 10 lbs. per tree) 5 tons of bark worth £5 per ton. These figures are somewhat lower

than those given by the Conservator of Forests for Victoria —Mr. Perrin. A sample of Australian seed averaged 1,450 grains to the ounce, a sample from the Cape Flats, 1,730.

Acacia saligna. SALIGNA WATTLE.

The common vigorous growing Wattle with the largish leaf that has been so successfully planted on the Cape Flats where it is erroneously known as "Port Jackson" Wattle. It comes not from Port Jackson (Sydney) but from Western Australia and finds thus a congenial climate on the Cape Flats, where the vigour of its growth fully compensates for the somewhat lower percentage of tan in its bark. According to Maiden this wattle should yield 30 per cent. of tan. In the Cape Peninsula bark has been obtained equal in its percentage of tannin to both Black and Pycnantha wattles when analysed. Tanners however will not accord it an equal value or price. The present value of *saligna* bark from the Cape Flats is about £5 per ton. Exported it has not fetched prices equal to Natal Black Wattle bark. Happily however there is a strong and steady local demand for it. It is the most important tanning body used in the Cape Town tanneries. It costs about £3 5s. to strip and deliver the bark in Cape Town. At Knysna *Saligna* grows with a vigour equal to that of Black Wattle, but it has a bushy instead of a tree-like habit of growth. *A. saligna* is indeed too often liable to run into small stems that are not worth peeling for bark. This tendency is believed to be checked by planting in rows as far apart as 5 yards. *Acacia saligna* is the "Golden Wattle" of West Australia. It is beautiful not only on account of its pendant masses of rich yellow blossom but for its hanging willow-like foliage. Hence the name *saligna*. In West Australia it has a widely spread habitat. In Western S. Africa there is no hardier tree and it flourishes everywhere from Bechuanaland and Namaqualand down to the Cape Flats. It always seeds profusely. The soaked seed has a stinking odour. An ounce of seed averages 1,240 grains.

Ailanthus glandulosa. **AILANTHUS—or Tree of Heaven.**

A leaf-shedder. A tree with very large ash-like leaves that smell unpleasantly. It has been used with little success for replanting burnt forest at Knysna. It seems to thrive best in districts where the summer is warm and the winters cold. It requires a good soil, abundance of moisture, and rarely gives good results in Cape Colony—a failure which is not a matter of much regret. Easily raised from seed or suckers. In a congenial soil and climate this tree sends up suckers like a Poplar, and is mistrusted in gardens for that reason. It is a native of S.E. Asia, and seems to succeed better in the brusque South East climates of Cape Colony than in the more equable South West. A species of silkworm (*Attacus Cynthia*) feeds on the leaves of this tree.

Alnus glutinosa. **ALDER.**

A leaf-shedder. The common European forest tree. Requires a moist, damp situation; gives a soft useful wood of a brown colour; very commonly used for making cigar boxes. It has long been naturalized in Cape Colony, along the borders of streams. Only in such situations is it worth planting, and then doubtfully. 1 ounce of seed averages 16,250 grains.

Araucaria excelsa. **NORFOLK ISLAND PINE.**

A Pine only in name. This graceful tree succeeds best in warm situations where there is plenty of water, as at Uitenhage: a great favourite on lawns where its curiously symetrical growth sets off other foliage. Raised from seed or layers. Fertile seed is difficult to obtain, and yet there are one or two trees near Cape Town that not only seed well but produce a crop of self-sown seedlings. These are isolated trees, so there is no question of fertilization from another tree. Many of the nurserymen's trees are raised from layers. Seedling trees are preferable. There are some fine trees in the Cape Peninsula, but they are liable to be injured by a black scale. There are conspicuously fine trees at Madeira. Cape trees appear to produce a useful timber.

Bougainvillea, sp. **BOUGAINVILLEA.**

This furnishes a strong and most gorgeous hedge. It succeeds best in warm, moist situations near the South-Eastern coast. The plants are expensive, but are easily multiplied by layering. For hedge purposes the thorny variety should be planted.

Callitris arborea. **CLANWILLIAM CEDAR.**

This is the Cedar of the Cape, and in most respects the most valuable of all the indigenous timbers. The wood has every good quality of the typical Cedar, except that it is somewhat light in colour. It is durable out of doors, in the ground, and in any situation. It is easily worked. It seasons well, and does not warp and twist like so many of the other timbers indigenous to the Southern hemisphere. It is strongly scented with a sweet aromatic perfume, that has been compared to a mixture of Cedar, Camphor and Sandal. A single plank, when freshly cut, will scent a house for months. The wood is so imbued with an essential oil that it distils naturally from the newly-cut wood, and condenses on metal or other articles near it. Cape Cedar is the only indigenous tree that has been successfully propagated by broadcast sowings. Seed is abundant, good, and easily obtainable at about 6d. to 8d. per lb.

It is, however, doubtful how far this tree will succeed away from its home on the rugged Cedarberg, a range of mountains situated 100 miles North of Cape Town, and running up to about double the height of Table Mountain. The Cedar grows there at an elevation of about 3,000 feet in a dry climate, with occasional heavy falls of rain and snow during the Winter.

Planted on the plateau and slopes of Table Mountain, Clanwilliam Cedar fails in a few years. The same result has followed its planting in the Tulbagh valley at Ceres Road.

The appearance of this remarkable tree is very like that of the common Cypress when young, and of the Atlantic Cedar when old. In the Cedarberg it is being conserved from cutting and fire, and extended by plantations. 580 seeds to the ounce.

Callitris cupressoides. **BERG CYPRESS.**

A small straight-growing tree usually found outside the timber forests, from sea-level upwards in the Western districts and Knysna, but only above 2,000 feet in the Eastern districts. Wood good, somewhat resembling the Clanwilliam Cedar, but less strongly scented, and hardly ever obtained large enough for sawing. In the Zonder End forests a tall slender tree growing in the dense evergreen forests. Before these forests were destroyed it was used for cooperage, &c. A tree of some size also in certain of the Drakensburg forests. It is easily raised from seed, but scarcely worth planting except in cold, wet localities.

Calodendron capense. **CAPE CHESTNUT.**

A partial leaf-shedder. The botanical name of this tree means literally "The beautiful tree of the Cape"; and it merits the attention of tree-planters perhaps more than any other native tree. The chestnuts are easily collected and grow without trouble into vigorous young trees. Choose a good soil and provide a little shade and moisture during the Summer. The Cape-chestnut is a partial leaf-shedder—a rare quality in a native tree, and of course a slow grower, like all the other native trees. It occurs in sheltered kloofs from Cape Town along the coast to Knysna. It is only found in the lower Knysna forests. In the Eastern forests it is much commoner, and there begins to ascend the mountains, where it is found through the Transkei, Natal, and on to the tropics. Its masses of pink flowers come into bloom about Christmas. It has a white close-grained wood, not particularly valuable.

Castanea vesca. **EUROPEAN CHESTNUT.**

A leaf-shedder. A very profitable tree to plant on a good soil and in cool situations free from drought. There are a quantity of trees that bear well at Fernwood, Newlands, near Cape Town. Rear and plant as described for

Oaks and Walnuts. Unfortunately it is very liable to some obscure root trouble, that in S. Africa seems to take it off at all ages. It flourishes on the hills above Funchal and the experiment has been tried of growing the Madeira tree at the Cape. These, however, have given no better results. For the present it seems best to regard the eating chestnut as a half-hardy exotic, to be raised with care and planted only in fertile situations. There are numerous trees scattered through the damp woods on the flanks of Table Mountain. There are about 10,000 nuts in a muid sack of sweet chestnuts.

Castanospermum Australe. **AUSTRALIAN CHESTNUT.**

A beautiful semi-tropical tree that will succeed well only in the warm moist parts of South Africa. The fruit is like the European Horse-chestnut. There is one good tree in the Municipal Gardens, Cape Town. It is only hardy, however, with a mean temperature 10° above that of Cape Colony, and is thus adapted for cultivation in the semi-tropical interior. It furnishes a large useful timber but not one of first-class quality.

Casuarina equisetifolia. **FILAO BEEFWOOD.**

This is a tree with a great history, but as a tropical species it is useless for planting purposes anywhere in Cape Colony. It will be invaluable for Mashonaland and the interior. Plantations of this tree on the sandy wastes of the Madras coast form beautiful and valuable forests. Simply by its vigorous growth it has fixed the sands there in the most permanent and effective fashion. It requires a mean temperature of from 72° to 82° Fah. to succeed well. The mean temperature of the Southern coast of Africa varies from 61° at Cape Town to 65° at East London. From Natal northward Filao should do well. It grows vigorously at Mauritius.

Casuarina leptoclada. **STRAIGHT BEEFWOOD.**

A handsome, hardy tree, the best Beefwood for planting purposes in South Africa. It grows well (except on very poor soils, such as Knysna sour veldt), and prospers in the severe climates of Cradock and Kimberley, where many other trees fail. Its leaf droppings form a clean carpet, lying more closely than Pine needles. This property is valuable in certain situations for fire protection, the clean soil preventing the spread of fire, while the branches are less inflammable than those of Pines. In the lower Karoo, the Leptoclada Casuarina is one of the best trees to plant. There is a handsome avenue of it at Cradock. But it will not stand excessive drought nor frost and hence in the upper Karoo should be planted with care. 23° of frost at Hanover in 1898, killed all the young Beefwoods in the Government plantation. At Kenilworth, Kimberley, it grows to perfection but is said to require more water than some of the trees there. 37,000 seeds go to the ounce.

Casuarina quadrivalvis. **BUSHY BEEFWOOD.**

An old-fashioned bushy tree, sometimes grown for the sake of its pretty drooping foliage. In the male tree the minute flowers appear at the tips of the branches in mid-winter, and throw a yellowish brown colouring over the dark foliage. This tree will grow on pure sand: there are one or two fine old trees on the Cape Flats. It has also been found to stand brack in both water and soil better than any other tree tried in the Government plantation at Robertson. The wood is red colored with large handsome medullary rays. 1,626 seeds go to the ounce

---

Casuarina tenuissima. **TENUISSIMA BEEFWOOD.**

Scarcely distinguishable from *C. leptoclada* except by its somewhat less vigorous growth.

Casuarina torulosa. **TORULOSA BEEFWOOD.**

Only distinguishable when young from *Casuarina leptoclada* by corky tissue on the stem. Seems to grow nearly

as well as *Casuarina leptocluda* at Knysna. Baron von Mueller, in "Select Extra-tropical Plants," describes the wood as tough, and the tree as attaining a height of 70 feet.

Catalpa speciosa. **CATALPA.**

A leaf-shedder. Grows like the Poplars from slips, and in similar situations, but requires less water. It must, however, have a rich soil, and does best where the winters are cold. The wood is valuable. It is not only light and easily worked like Poplar, wood but is durable out of doors. In America it is used for railway sleepers without being creosoted. It does no good on the poor soils and in the mild winters of the S.W. districts, but succeeds under irrigation at Oudtshoorn and in the Karoo, and in rich forest soil at Kynsna. Its large broad leaves are easily torn by the wind, and for this reason it requires a sheltered situation. 1 ounce of seed averages 1,650 grains.

Cedrus deodora. **DEODAR.**

One of the grandest of trees in its home on the Himalayan mountains. Fairly grown specimens can be seen in gardens in the Cape Peninsula. But it only grows vigorously in Cape Colony on elevated situations where the soil is rich. Provided it is watered it does well in the Karoo and northwards. It is useless to attempt to plant it in the ordinary poor soil of the mountains or on low hot plains. The finest specimens I have seen were growing on the Katberg mountain in the rich soil of burnt forest.

This tree scarcely differs from the Algerian Cedar, a native of the mountains of N. Africa growing in a zone between 4,000 feet and 5,000 feet where the snow lies for five months out of the year. (Mathieu.)

Cedrela australis. **AUSTRALIAN CEDAR.**

Not a true Cedar, but a valuable timber tree of N.S. Wales and Queensland. It is a partial leaf-shedder, and well worthy of extended cultivation here in damp warm localities with abundant summer rains. Very slow-growing

in the Cape Peninsula. It has been planted to some extent by the Forest Department of N. S. Wales, *It is the most valuable timber tree on the Australian continent.* Closely allied to the Indian forest tree Toon—*Cedrela toona.*

Ceratonia siliqua. **CAROB, LOCUST TREE** or **ST. JOHN'S BREAD.**

In Spain, Algeria, and the Eastern Mediterranean a common tree, 40 to 60 feet high: planted to some extent in Australia. A valuable tree for farms. It yields a sweet edible pod, very good for fattening stock. Indeed it is said to be one of the chief ingredients in "Thorley's food for cattle." Unfortunately it is not generally hardy in the Colony, nor does it bear here as in Cypress, where the trees yield an enormous crop, much of which is exported. The best grown trees I have seen in the Colony were at Uitenhage. It requires dry, very hot summers, mild winters, and a good soil. Single trees rarely bear as the male and female flowers are usually on different trees. Grafting is not necessary; but is useful to improve the fruit of bad bearers, and to increase the proportion of female trees. The Carob tree is slow-growing but long lived. Wood hard and ornamental. 172 seeds go to the ounce.

Corylus avellana. **FILBERT.**

A leaf-shedder. Filberts rarely seem to grow with much vigour in Cape Colony, and when they grow they usually do not fruit owing perhaps to the male and female blossoms not appearing together. The climate ought to suit them since they are natives of Sicily and S. Europe, but they probably require a rich soil with lime and more moisture in the air. *Corylus colurna*, the Grecian species, would probably do better, or perhaps *C. pontica*, the Caucasian species.

Cryptomeria japonica. **CRYPTOMERIA, or JAPANESE CEDAR.**

A peculiar looking scaley-leaved tree growing readily from cuttings. This makes its propagation easy. It is a

great timber tree in Japan. It succeeds well in the wet eastern Himalayan mountains near Darjeeling. In Cape Colony it has proved susceptible to drought, and seems only suited to planting on wet mountains. Thus in the Cape Peninsula at sea level it is a poor tree, but on the lower plateau of Table Mountain at 2,500 ft. it flourishes with the vigour of the Darjeeling tree. Wood valuable—soft, durable, white, and with a scent of Cedar.

Cupressus funebris. **THIBET CYPRESS.**

There are a few good-sized trees of this species in the Cape Peninsula, but they have an unhealthy appearance with scanty foliage pointing to the interior plateau country as the right place for this species in S. Africa. The seed is not easily obtainable and the species remains for trial at Hanover and other inland elevated localities.

Cupressus goveniana. **GOVENS CYPRESS.**

This is a Californian Cypress associated there with our familiar Macrocarpa Cypress. Compared to the latter it is inferior both in stature and celerity of growth. It has been cultivated for 15 years in the Government nurseries and plantations near the coast and so far has shewn no qualities making it worthy of cultivation beside the Macrocarpa Cypress.

Cupressus lawsoniana. **LAWSON'S CYPRESS.**

Branchlets in graceful curved planes, having a characteristic odour when rubbed. Lawson's Cypress is a vigorous strong grower in the South of England. In S. Africa it gives but mediocre results even in cold, wet localities, and near the coast it is a poor slow-growing stunted tree quite worthless for the production of timber. 2,300 seeds go to the ounce.

Cupressus Lawsoniana. **FRAGRANT CYPRESS.**

A variety of *C. Lawsoniana*, with more aromatic foliage. 2,280 seeds go to the ounce.

Cupressus lusitanica. **PORTUGUESE or GOA CYPRESS.**

The experience with this, like Chinese Cypress, is so far varied. It is too soon yet to say what will be its ultimate value to S. African tree-planters. In appearance it is almost indistinguishable from Chinese Cypress and sometimes *C. torulosa.* Hence many of the conflicting reports: to properly sift which further experience and growth in arboretums are necessary.

After inspecting the specimens in the Kew herbarium I have come to the conclusion that *C. lusitanica* and *C. sinensis* are but varieties of *C. torulosa.*

Cupressus macrocarpa. **MACROCARPA CYPRESS.**

This tree, the noblest of all the Californian Cypresses, seems to have a great future before it in S. Africa. It stands the South-easters at Cape Town better than most trees, and is extensively planted there for that reason. It is hardy in Devonshire, where it ripens seeds: cultivated in other parts of England. Wood fragrant and durable, similar to the common Cypress. The foliage when crushed has an odour of scented turpentine. The Macrocarpa Cypress must be planted close or it will take the well-known bushy form. If required as a breakwind it is better to plant sparse and let it run out into the bushy form.

For the coast, and up to elevations of 2,000 or 3,000 feet, none of the Cypresses can rival the Macrocarpa. At Tokai it takes its place as a hardy forest tree growing at about two-thirds the rate of the Cluster-pine. It has a dense couvert, and to its other good qualities adds that of being decidedly shade-bearing. At about 4,000 feet in Cape Colony it usually becomes tender to frost and drought, and should be replaced by the common or Himalayan Cypress.

Cupressus sempervirens. **COMMON CYPRESS.**

This is the common Cypress of the Mediterranean region and Southern Europe. It will grow over almost the whole of S. Africa, but is hardiest in the Karoo and the plateau country of the interior, where it gets a climate more like

its native Persia. It has been aptly called the Oak of the Karoo. Few trees better stand brack, frost and drought, while the growth there for a Cypress is rapid and vigorous. In the Cape Peninsula and near the S.W. coast it is stunted and killed by the Summer droughts, unless planted on good soil and kept well cultivated, nor is the subsequent growth there ever equal to that in the Karoo. But the value of the wood makes it well worth the good soil and extra expense of cultivation. In some localities it shows a good natural reproduction from self-sown seedlings. On poor sandy soil the growth is very slow. It is in the Karoo and warm rich valleys, as at Kat River, that these trees are seen at their best. There they stand drought well, and mount up gradually to lofty dimensions. The wood, though white in colour, smells like Cedar, and is very durable. The spreading and the upright kinds are merely varieties, both growing from the same seed. The former is the wild, the latter the cultivated form. The Cypress grows as a forest tree in North Africa, where the climate, except being rather hotter, is similar to South Africa. The Colonial Cypress bears good seed, usually better than can be imported. To save the seed, gather the Cypress cones before they open and as soon as the seeds are plump and dark brown in colour. The seed is best sown in Autumn, although Spring sowings sometimes give a good germination. It may be pricked out into tins or beds, makes good roots in the nursery and transplants easily. The point where this tree demands particular and special care is in the weeding and cleaning after planting out. The common Cypress is one of those trees that merit more extended cultivation. It stands extremes of drought and heat, and may therefore be planted far in the interior. 4,560 seeds go the ounce.

Cupressus sinensis. CHINESE CYPRESS.

There are handsome specimens of this tree in the arboretum at Tokai where the growth is as good as *C. marcrocarpa* or *C. torulosa:* also at Ceres Road. It has been extensively planted in the coast plantations but not however with

uniformly successful results. Further trial is necessary in the Karoo and inland plantations. As a nursery tree no cypress is more easy to raise.

Cupressus torulosa. **HIMALAYAN CYPRESS.**

This is the noble tree of the dry eastern Himalayas, growing at elevations from 6,000 ft. to 8,000 ft., one of the largest of the Cypress tribe. In the Tokai nurseries it grows with vigour, but when planted out the growth is less promising. There is a heavy percentage of failures, and the trees that remain never show the vigorous growth of those in the Karoo and the plateau country of the interior. This indeed is only what would be anticipated from the tree's natural habitat. At Hanover it seems to be the most vigorous-growing of all the Cypresses, and to be the hardiest against frost. In 1898 it was untouched by 23 degrees of frost. It has become naturalized on the Nilgiris in S. India, lat. 11°, elevation 7,000 ft., rainfall tropical and heavy. At Robertson it suffers from drought and hot winds. It is probably somewhat tender to drought even at its natural elevation.

The wood is a first class timber of great value.

THE GUMS OR EUCALYPTS.

All gums are raised in the same way. Sow the seed in a sandy soil, in Spring or up to Christmas, barely covering the seed with a sprinkling of sand or saw-dust, water sparingly and shade till the seed has germinated: then gradually take off shade and allow the young plants to grow till they are from ½ an inch to 1 inch high, when it is time to prick out into the boxes or tins where they are to grow for the rest of the summer. 25 young Gums can conveniently be pricked out into a parafine tin cut lengthways, *i.e.*, each parafine tin gives two shallow trays, and each tray takes 25 plants. For railway carriage it may be useful to remember that a tin of 25 gums ready to plant weighs about 25 lbs. The young plants are planted out in the ground during the Winter rains in the West of the Colony, during the Spring rains in the East. As has been

explained under Nurseries, Gums may be kept over a second year in tins, but the quick-growing kinds, such as the Blue-gum, do better if planted out the first season.

In popular parlance every Gum that is not a Blue-gum is a Red-gum. As there are over 120 species of Gums, to talk of "Red-gum" is not much more definite than "green-tree."

The best Gums to stand frost are :—

Eucalyptus amygdalina.
" *coreacea (pauciflora of Mueller).*
" *viminalis.*
" *Gunii.*
" *rostrata.*

For the drought and frost of the Karoo, Maiden quotes the following :—

Eucalyptus crebra.
" *macrorrhyncha.*
" *capitellata.*
" *sideroxylon.*
" *hemiphloia var-albens.*

Cattle will usually eat all the Gums but the Blue-gum, and this even with its strong scent is not safe from goats. *E. viminalis* seems to be the only Gum ordinarily eaten by locusts. All the Eucalypts produce timber that is hard, heavy, and strong, but which seasons badly and is liable to crack and warp on drying. These bad qualities are very noticeable in the worst of the Eucalypts such as Blue-gum, less so in the better as Jarrah. The durability of Eucalypt timber varies much. Jarrah, Iron-bark and a dozen or so others enumerated below will undoubtedly last well in the ground; a larger class are fairly durable in the ground under ordinary circumstances; a much larger class with all their hardness and difficulty of working are no more durable in the ground than a piece of soft easily-worked pinewood. Of no genus is it more difficult to classify and identify the species and of no genus is a more intimate knowledge of the species necessary to the Forester who is called upon to recognize the few valuable species from the great mass of nearly worthless species; and in planting to fit each to its proper climate.

Of the sylvicultural requirements of the various species of Eucalypts we know little. No professionally trained Forester has visited and described the Eucalypts in their native forests, and our Eucalypt plantations in S. Africa are as yet too young and partial to throw much light on a subject so important to Forestry in this country. Broadly speaking the Eucalypts are light-demanders and grow in open mixed forests. But certain species such as Karrie form dense pure forests.

The Best Timber Eucalypts.

Broadly speaking, it may be said that the West Australian Jarrah and East Australian Iron-barks, and the inland Rostrata Gum, occupy the first place. But close on these follow the West Australian Karrie, the South Australian Sugar-gum and the valuable hard woods of Eastern Australia enumerated below. Many of these extend into the scant winter rainfall of South Australia. We get—

From West Australia, with a good winter rainfall:—
- Jarrah.
- Karrie.

From South Australia, with a light winter rainfall:—
- Sugar Gum.
- Leucoxylon Gum.

From East Australia, with mixed and summer rainfalls, roughly arranged in order of merit:—

- Iron barks: Paniculata, Crebra, Siderophloia, Sideroxylon,
- Sugar Gum,
- Tallow wood,
- Tereticornis,
- Acmenoides,
- Pilularis,
- Resinfera, Longifolia, } Jarrah substitutes.
- Propinqua, an Iron-bark substitute.
- Maculata,
- Saligna.

From the interior with scanty, uncertain rains:—

Rostrata Gum,
Crebra Iron-bark,
Fasciculosa,
Leucoxylon,
Polyanthema.

Eucalyptus acmenoides. **WHITE MAHOGANY GUM.**

Maiden speaks highly of this tree, saying that, except some tendency to shell off, it is as good as Tallowwood. It is a native of the coast and coast mountains of northern N.S. Wales and Queensland. Sifted seed averages 7,020 to the ounce.

Eucalyptus amygdalina. (*E. gigantea*).

GIANT GUM.

This and Karrie are the two *Eucalypts* that occasionally produce the largest trees in the world. The seed of this tree is very fine, and so like the chaff that the number of seeds to the ounce cannot be easily counted. Averages about 6,600 to the ounce.

Under the name *E. amygdalina* are included a number of varieties which, from a practical point of view, are really quite different trees. They need not be enumerated here. *Regnans* is the giant variety, of which specimens measuring over 400 feet have been cut. The Peppermint (*Var. latifolia*, Maiden & Deane) is found up to 5,000 feet on Mount Kosciousko. This would correspond with 7,000 or 8,000 feet in Cape Colony. *Risdoni* is a dwarf frost-bearing variety, with thick leaves, from Tasmania that has been sometimes mistaken for *E. coreacea*. *Mountain-Ash* is a comparatively good timber variety. All of the varieties are more or less hardy against frost. They are natives of Tasmania and S.W. Australia, and require a cold, moist climate, with a good all-the-year-round rainfall. All produce perishable second rate timbers.

Regnans is worth planting for its rapid straight pole-like growth. In the South-west of Cape Colony this tree grows often as fast as the Blue-gum with a beautifully straight habit,

even when isolated, as it usually is, from the neighbouring less lofty trees. It is readily recognizable by its smooth white marbled bark and its straight habit; or, when young, by the straight, thin, stalkless leaves arranged in opposite pairs, the leaves full of Eucalyptus oil and crowded with oil dots, the twigs brown and rough. The leaves of this species contain the largest proportion of oil, and are those preferred for extracting Eucalyptus oil. No Eucalypt coppices more readily, and hence it is easy to lay down copses for the production of oil and firewood. Mueller abandoned the original and appropriate name of *E. gigantea* for the meaningless one of *E. amygdalina*.

Eucalyptus calophylla. **CALOPHYLLA GUM.**

This handsome gum, a native of S.W. Australia, is very like a white variety of *E. ficifolia*. These two gums planted together produce striking effects, their beautiful crimson and white flowers contrasting with the dark handsomely veined leaves from which this species gets its name of *calophylla*, or "beautiful leaf." It has a peculiar brown powdery bark. Wood strong and light, but not durable. *E. calophylla* likes a fairly good rich soil and winter rains or watering. Natural reproduction from seed, good in the Government plantation at Ceres Road. This species is not worth planting for timber in S. Africa. Sifted seed averages only 270 to the ounce.

Eucalyptus capitellata. **CAPITELLATA STRINGY BARK.**

May be tried along with Macrorrhyncha Stringy bark which see.

Eucalyptus citriodora. **LEMON-SCENTED GUM.**

A native of Queensland. Does best at no great distance from the coast. Pollard or coppice if a large supply of the scented leaves be required. The mature leaves have little scent, but the young seedling leaves and the young coppice or pollard leaves have a strong perfume. The essential oil is distilled and exported from Australia for use in scented

soaps, &c. This tree rapidly runs up with a tall pole-like stem and smooth ashen bark, but, except in its native climate of plentiful summer rains, the foliage soon becomes thin and poor. The timber grown on the coast of northern N.S. Wales and Queensland is a useful second class wood—strong and specially useful for bending, but of somewhat doubtful durability. Sifted seed averages 8,484 to the ounce.

Eucalyptus coriacea. (*E. pauciflora Mueller.*)
CORIACEA GUM.

This is reputed in the Free State to be the most frost-resistant of all the Gums. Otherwise it has nothing to recommend it. Easily recognised by the peculiar veins of its thick leaves. These run more lengthwise than any other Eucalypt except *E. stellulata* and have the effect of making the leaf look like a Wattle leaf. East Australian, it prefers summer and mixed rains. A small drooping tree at Tokai.

E. coriacea and its first cousin *E. stellulata* grow high up on Mount Kosciousko. Maiden records the "Snow Gum," a variety of *E. coriacea*, as growing at 6,000 feet on Mount Kosciousko. It there marks the upper limit of tree vegetation, thus withstanding more frost and snow than any other tree in Australia. 6,000 feet there would be equivalent to 8,000 or 10,000 feet in South Africa, or, in other words, the Snow-gum variety of E. coriacea should grow up to the top of the highest mountains in S. Africa.

Unsifted seed averages 2,400 to the ounce.

Eucalyptus cornuta. **YATE GUM.**

A common bushy Gum in the Cape Peninsula, where it is planted as a wind-screen. To form a tree the *Lehmani* variety must be chosen and planted close, 3 ft. x 3 ft. If this be done the poles and timber of the Yate are valuable for their elasticity in cart-making, &c. The tree variety of the Yate seems to like cold and damp. I have seen it flourishing in damp cold glass-houses in England and for some years out of doors near Torquay, in Devonshire. In S. Africa drought and hot winds soon stunt the Yate. It is

quite hardy and a perfect wind-break in the colder parts of the Cape Peninsula. At Knysna the growth is similar to that in the Cape Peninsula. Unsifted seed averages 6,120 to the ounce.

Eucalyptus corynocalyx. **SUGAR GUM.**

This is the valuable Gum that has been so largely planted in S. Australia. It is native there. As a pretty tree, a strong-grower, and one yielding a first-class timber there is no Gum to touch it for planting in a climate of light winter rains. It is showing an admirable growth in the Government plantation at Robertson. The timber in addition to its great durability is said to be less liable to warp than that of any of the other Eucalypts.

Eucalyptus corymbosa. **BLOODWOOD.**

Handsome, strong-growing and thickly foliaged in its climate of summer and mixed rains, with the rough bark and durable wood of an Iron-bark; but the timber is so full of the blood-red streaks of the gum from which it gets its name that it is worthless for sawing. It does well at Knysna.

Eucalyptus crebra. **CREBRA IRONBARK.**

This is a straight, slender, very rough-barked tree, with thin drooping foliage and very small flowers and cones. It is widely spread in East Australia, but is found chiefly on the dry inland side of the coast mountain range. In South Africa it flourishes where the rains are scanty and the frosts not severe, as at Worcester: always a slow-growing tree but very hardy against drought. To some extent the straightness of its growth compensates for the slenderness of its bulk, for it cuts up into fencing posts without waste, that are said on the best authority to last in the ground almost like our Sneezewood or Cedar. The Crebra Iron bark is one of the most useful trees to plant on dry South African farms in spite of its somewhat slow growth.

Eucalyptus diversicolor. (E. colossea.) **KARRIE.**

The handsome giant Gum of S. W. Australia. It succeeds well on the lower slopes of the Table Mountain Range, at Knysna, and in the wetter S. districts generally. In the Cape Peninsula the growth is equal to and more regular than that of the Blue-gum, while the foliage is more shady and handsome. It is perhaps the most shade-giving of all the Eucalypts naturalized in South Africa. Some fine specimens may be seen at Tokai and Wynberg. Karrie timber is probably less durable than that of Jarrah but stronger and usually better grown. It has lately been used with success for wooden street-paving. It is now being extensively imported into S. Africa for Railway sleepers. Karrie is one of the giant Gums of Australia—the highest trees in the world,—and probably the tallest of these. I have seen a section of wood from a Karrie tree that was certified to have measured 430 ft. in height. Unsifted seed averages 1,770 to the ounce.

Eucalyptus ficifolia. **CRIMSON-FLOWERED GUM.**

This striking tree is a native of S.W. Australia, though it grows and is planted for the sake of its gorgeous flowers in other parts of Australia. In the S. W. districts of Cape Colony it succeeds to perfection, and though somewhat slow-growing, it does well in most soils. Wood of no value. Only worth planting as an ornamental tree. The natural habitat of this tree is within ten miles of the coast. For inland districts the crimson-flowered variety of the Leucoxylon Gum may be planted, but this has little of the gorgeous colouring of *E. ficifolia.* Sifted seed averages 854 to the ounce.

Eucalyptus globulus. **BLUE GUM.**

A native of Tasmania and the cooler parts of Australia. Grows to perfection only in the cooler parts of the Colony, *i.e.*, the S. W. districts, and above 2,000 feet elevation in the Eastern districts. Will grow anywhere in South Africa except where the frosts or droughts are very severe

At Kimberley and in the Karoo, for instance, the growth is inferior to that of some other trees. At Kenilworth (Kimberley) the Blue-gum is steadily dying out and the remaining trees have a diseased unhealthy look. Generally in Cape Colony the Blue-gum is the fastest growing tree that can be planted, and should be preferred when a large bulk of coarse timber is sought. Old trees produce a tough timber useful for many purposes, such as sleepers, naves of wheels, and house building. It is a wood that can be sawn without difficulty, but which the cross grain renders very hard to split or plane. The Blue-gum in good growth (as on the Nilgiri Mountains in S. India) will run up 1 ft. per month or 10 ft. per year, for the first 8 or 9 years, and in bulk will yield a yearly increment of 10 tons of wood (reduced to dry weight) per acre per year for 25 years or more. In the Government plantation at Worcester, Cape Colony, figures not much below these have been realized. The Blue-gum coppices, *i.e.*, shoots again when cut, so in this respect also it is well adapted for fuel plantations. Natural reproduction from seed is uncertain and rarely abundant.

The Blue-gum wood from the Worcester plantation was sold for use in the diamond mines of Kimberley. The plantation was formed in 1877. The net profit from 60 acres (after allowing interest at 3 per cent. on the cost of formation and up-keep) was £3,438. The coppice re-growth is denser and stronger than the trees originally planted.

As a further illustration of the value of a Blue-gum fuel copse, let us take the case of a few acres planted near the homestead of a farm. An ordinary household in fairly well-to-do circumstances uses about five tons of coal or its equivalent per year. One acre of Blue-gum copse in fair growth will yield continually ten tons (dry weight) of wood fuel per year. The cutting up of the small wood yielded by coppice is not expensive; but let us suppose that of this ten tons of wood nearly one-half goes in working expenses, and that from one acre of Blue-gum copse we only obtain the net equivalent of five tons of coal, we arrive then at the conclusion that *one acre of Blue-gum copse will keep a household always comfortably supplied with fuel free of cost.*

What this free fuel means, in pounds, shillings and pence, will of course depend on circumstances. To a household in the suburbs of Cape Town it means about £15 a year. In many other Colonial towns where wood has to be brought from a distance it means more. At Knysna the cost of transport makes wood fuel dearer than at Cape Town. To many a farmer free fuel means the saving of the scanty indigenous trees on his farm—the beauty, the shade, the water, and the shelter for stock, produced by these trees. To every one who has the means we would counsel the planting of an acre of Blue-gum copse near the house or homestead. It will render the surroundings more healthy and pretty. Under favourable circumstances it will cost about £7 (planting 5 ft. x 5 ft.), and will repay its cost twice over the first year. It may be allowed to grow untouched for 10 or 12 years, and then cut over gradually during the next 10 years; and so on, in perpetuity, one-tenth of an acre being cut over and ten tons of wood harvested, each year.

In the wonderful growth of the Blue-gum the inhabitants of those countries where it prospers possess a distinct natural advantage which should not be neglected.

An ounce of sifted Blue-gum seed averages about 10,000 good seeds: unsifted about 4,200 seeds.

E. goniocalyx. GONIOCALYX GUM.

A quick-growing frost-bearing tree, but less drought-resistant than some of the Gums. It is often as quick-growing as Blue-gum but the timber is little more valuable. It may be tried along with Blue-gum for its hardy quick-growth. It likes winter or mixed rainfalls.

Eucalyptus Gunnii. GUNN'S GUM.

Has proved a hardy frost-bearing species in S. Africa. In Australia the "Cider" variety is found up to 5,800 feet on the Australian Alps, which is not far below the limit of eternal snow—6,500 feet. For growth in similar localities seed would probably have to be specially obtained from that

altitude. I have found Gunnii a hardy strong grower almost wherever planted. The timber is quite second rate. Unsifted seed averages 14,130 to the ounce.

Eucalyptus hemiphloia. Var. Albens.
GREY BOX GUM.

Maiden recommends this for planting in inland dry districts such as the lower Karoo. It is slow-growing and furnishes a somewhat ill-shaped and very hard but durable timber.

Eucalyptus leucoxylon. **LEUCOXYLON GUM.**

This has been wrongly described as a smooth-barked variety of the Sideroxylon Iron-bark. (Mueller describes the two trees under leucoxylon.) The Leucoxylon Gum furnishes a first-class timber almost equal to the Iron-bark, with which it has been confounded. It is of a sprawling habit when young but then shoots upwards with great rapidity. It has shewn a remarkably fine growth under irrigation at Clanwilliam—winter rainfall 9″: high summer temperature.

Eucalyptus longifolia. **LONGIFOLIA or WOOLLY BUTT GUM.**

This tree is a native of extra-tropical-Australia and winter or mixed rains. It has been planted to a considerable extent in the Government plantations in Cape Colony. It is a favourite at Ceres Road on account of its straight, regular and vigorous growth. Mueller and Maiden both give the timber a good character, though the latter adds that it is deficient in strength and liable to gum veins and unsoundness at the heart. The timber is dark red and not unlike red Iron-bark in appearance for which it is sometimes substituted. It is very durable. Longifolia Gum may be considered to afford a good second class timber, excellent for fencing posts on account of its straight growth and durability.

Eucalyptus macrohyncha. **MACRORRHYNCHA STRINGY BARK.**

This is the common stringy-bark of Victoria and N. S. Wales. It is recommended by Maiden for inland planting, in moderately frosty districts, of light summer rain, such as the lower Karoo. The wood is not durable and has little to recommend it. Do not plant it till more valuable Eucalypts have been first tried.

Eucalyptus maculata. **SPOTTED GUM.**

This and *E. citriodora*, are regarded by Mueller as varieties. See under *E. citriodora.* It is a fine timber tree of N. S. Wales, most abundant in the mixed rainfalls of the south. Bark smooth and spotted like a Plane tree. Timber looks like Ash. It is coarse-grained and somewhat elastic like Ash. Heartwood durable. It succeeds on poor soils and dry gravelly ridges.

Eucalyptus marginata. **JARRAH.**

One of the three or four imperishable woods of the world, ranking with Greenheart and our own Sneezewood in this respect. Jarrah sleepers in S. Africa gradually crack to pieces, but show very little decay. From S.W. Australia the timber is sent to various parts of the world. It has recently been used for street-paving in London and, to a large extent, for sleepers on the Cape Government Railways. For fencing posts, culverts, harbour works, and all out-door uses, the timber is almost unsurpassed. It is a native of West Australia, and a purely winter rainfall. It is useless to attempt to plant it except in the west of Cape Colony. Much disappointment has been caused by ill-judged attempts to plant it elsewhere in S. Africa. It is never a fast-growing tree, nor a vigorous grower like the Karrie, but in West Australia it prospers in drier country and over a much wider area than the Karrie. On the lower slopes of the Table Mountain range at Tokai its growth averages little more than half that of the Karrie. Sifted seed averages about 4,600 to the ounce.

Eucalyptus melanophloia. **MELANOPHLOIA IRONBARK**

Mueller describes this as "a middle-sized tree with a deeply-furrowed bark and mealy whitish foliage, with strong and durable timber." Native of N.S. Wales and Queensland. Maiden says it is too small and stunted to be of any use as a timber tree.

Eucalyptus microcorys. **TALLOW-WOOD.**

So called because of the greasy feel of the wood when first cut.. Maiden ranks this as the most valuable of all the East Australian Eucalypts after the Iron-barks. It is quick-growing and reaches giant dimensions in Australia. It is certainly one of the best Eucalypt timbers. Besides being strong and very durable, Tallow-wood timber, on account of its greasy nature, seasons better than other Eucalypts. Its general appearance is like very hard Ash. This tree requires a heavy summer rainfall, thus limiting its natural habitat in S. Africa to the Eastern coast districts and mountains, and perhaps also to the semi-tropical interior. So far it is growing well at Tokai. Tallow-wood trees, when young, have a pretty curly leaf that is unmistakeable. They grow at a rapid rate, and speedily become one of the largest of the Eucalypts. Bark stringy. Unsifted seed averages 910 to the ounce.

Eucalyptus microtheca. **MICROTHECA GUM.**

This is a valuable inland Eucalypt that should be tried along with Rostrata in dry semi-desert country. Its timber has not got the established reputation of Rostrata or Sugar Gum, but it is said to be sufficiently durable to last well in railway sleepers. Its natural habitat is a wide one--all over the inland districts of Eastern Australia.

Eucalyptus obliqua. **GUM OBLIQUA STRINGY BARK.**

This is the great forest tree, the giant Stringy bark of Victoria and Tasmania. It produces large, straight-fibred timber, not so excessively hard as many of the Gums, but unfortunately with little durability, so that it only ranks as second class amongst Eucalypts. Seed indistinguishable from chaff.

Eucalyptus paniculata. **PANICULATA IRON-BARK.**

Maiden classes this as the most valuable of the Iron barks, in other words, as *the best Eucalypt of all Eastern Australia.* The timber is very durable, strong and hard. "Cuts almost like horn," says Maiden. Is a tree of the Eastern coast and mountains of N.S. Wales, thus requiring a plentiful summer or mixed rainfall. Is said to flourish along the coast districts of S. Africa, from East London to Natal, and to grow rapidly. There is a large vigorous tree at Paarl. It should certainly be more extensively planted. *E. fasciculosa* is a desert variety or sub-species. Unsifted seed averages 800 to the ounce.

Eucalyptus pilularis. **FLINTWOOD or BLACK-BUTT.**

As a young tree at Tokai in the group arboretum this has proved to be the fastest-growing of all the Eucalypts, or, in other words, of all the trees there. It has also the densest couvert, and is to some extent shade-bearing. These qualities place it in the first rank as a tree for forest plantations. Its dense foliage hangs in a regular graceful sweep that is characteristic. Maiden describes the timber as pale-coloured, strong, durable, thoroughly safe and well-tried. He says: "After Iron-bark I would place this timber second only to Tallow-wood, amongst our hard woods, for general purposes."

In Australia it is quick-growing, and trees up to 300 ft. in height are met with.

Its habitat is the well-watered Eastern coast districts of Australia, from the mixed rainfall of Gippsland to the purely summer rainfall of Queensland.

Eucalyptus polyanthema. **POLYANTHEMA GUM.**

This is a useful but not first class timber of the inland arid country. The wood is excessively hard and liable to unsoundness at the heart. This species is very hardy against drought, but usually slow-growing and small. It is easily recognized by its small whitish round leaf.

Eucalyptus propinqua. **GREY GUM.**

The timber of this Gum is frequently substituted for Iron-bark. It is as durable as Iron-bark, but not so strong, being much cut up by gum-veins.

Eucalyptus punctata. **PUNCTATA GUM.**

This is a large, well-shaped and quick-growing tree at Tokai, very similar in appearance to Karrie, and with wood perhaps equal in value to Karrie. On the whole it is a second-class timber—excessively hard and less durable than the Iron-barks and first-class Eucalypts. It is a native of Eastern Australia, and should be preferred to Karrie for summer rainfalls. Unsifted seed averages 1,600 to the ounce.

Eucalyptus resinifera. **RESINIFERA GUM.**

This appears to be a first-class timber when grown in a suitable climate, the coast of northern N. S. Wales and Queensland, where the rainfall is abundant and falls almost entirely in summer, and the mean temperature is semi-tropical. The wood is very like Jarrah in appearance. Seed indistinguishable from the chaff.

Eucalyptus robusta. **MAHOGANY GUM.**

This is a tree that has given disappointment in S. Africa. Its habitat is characterized by warmth and plentiful summer rains. It has been heedlessly planted in all sorts of climates in S. Africa with results that might have been foreseen. As a strong-grower it shoots up vigorously for a few years then seeds early and begins to decline in vigor. In its proper climate it yields a second-rate timber, useful for many purposes. Wood from trees grown in the Government plantation at Ceres Road proved as worthless as Blue-gum wood. Unsifted seed averages 1,908 to the ounce.

Eucalyptus rostrata. **ROSTRATA GUM.**

This is the well-known Red Gum of the S. Eastern colonies of Australia. It is considered as durable there as is Jarrah in West Australia. It is found on dampish ground over nearly the whole dry Australian interior, and is therefore more generally useful for planting purposes than Jarrah. It has been called for this reason "The Farmer's Friend." It must always be planted close (not more than 4 ft. apart), or it will make a poor stem. It may be planted close in pretty picturesque groups near houses or the homestead on a farm, and the thinnings, as the trees grow up, will furnish useful durable poles and lasting timber for every outdoor use on a farm. In Australia the home of the Rostrata Gum is on river flats, over almost the whole of the continent. It is rarely found on the coast lands. At Tokai it is of uncertain growth. In S. Australia, where it is most abundant, it ascends the mountains to 2,000 feet. This would be equivalent to about 3,000 feet on the plateau country of Cape Colony. On the upper Karoo, 4,000 feet, it is liable to be cut down by frost. In the severe frosts of 1898 it perished at Hanover (23° of frost), but survived near Britstown. It is thus a tree that rejoices in extremes of heat and cold, no great elevation, a rich soil, and alternations of moisture and drought. We see it at its best at Robertson and Worcester, where it is a rival of the Blue-gum in quickness of growth, and vastly superior to the Blue-gum in its ability to stand drought, heat and brak. Unsifted seed averages about 25,000 to the ounce.

Eucalyptus saligna. **SALIGNA GUM.**

The so-called Blue-gum of N. S. Wales. A useful second-class timber, of good colour, strong, sound, straight in the grain and not so difficult to work as some of the Eucalypts, but of uncertain durability in the ground.

Eucalyptus siderophloia. **SIDEROPHLOIA or BROAD-LEAVED IRON-BARK.**

Maiden places this third among the Iron-barks, but it is little, if at all, inferior to *E. Crebra*, and is undoubtedly a

first class timber among the Eucalypts. The wood is of a light reddish colour, hard, strong, and very durable. It is sometimes known as "Red Iron-bark." Sideroxylon is the real Red Iron-bark. Maiden mentions that the timber from northern N. S. Wales is apt to shell and split on exposure and hence is not liked for engineering purposes. As a general rule it is a really fine Iron-bark.

The Siderophloia Iron-bark is an Eastern coast species extending from the mixed rainfalls of southern N. S. Wales, to the purely summer rainfalls of Queensland.

E. sideroxylon. **SIDEROXYLON IRON-BARK.**

The Blue-gum of S. Australia, so called from its bluish appearance. Maiden gives this the fourth rank among the four valuable Iron-barks of East Australia. However, its fine red colour and comparative softness will render it preferable for many employments to the harder pale Iron-barks. Mueller's name for this tree is rough bark *Leucoxylon.* This tree is easily recognisable by its very rough black bark and largish bell-like cones. It is slow-growing but seems to be hardy everywhere from Kimberley (on red loam at 4,000 ft. elevation) to the sands of the Cape Flats. It has a wide habitat in Australia, from the scanty winter rains of S. Australia through the all-the-year-round rainfalls of Victoria and on to the irregular summer rains of N. S. Wales.

There is a crimson-flowered variety of this tree which may be planted in inland districts where the more beautiful *E. ficifolia* is not hardy. The usual flower is white or pinkish. Unsifted seed averages 27,500 to the ounce.

E. stellulata. **GREEN GUM.**

Recorded by Maiden at 3,000 ft. on Mount Kosciousko, see under *E. coriacea.* It is occasionally seen but is not worth planting in S. Africa.

Eucalyptus tereticornis. TERETICORNIS GUM.

Botanically this tree scarcely differs from *E. rostrata*, and it is convenient to look upon it as a coast variety of that tree. In the forest however the two trees are apparently different species. Tereticornis has a sturdy, robust trunk, with a well-developed crown as contrasted with the drooping foliage and slender branching stem of Rostrata. Rostrata delights in subsoil moisture and the intensely dry air of the interior. Tereticornis likes the moister air and rain of the coast districts, though on elevated country it can put up with as little as 16″ or 18″ of rain. Of the two, Tereticornis is certainly a much better tree to plant near the coast and I know not how far inland. It certainly stands severe frost and considerable drought; and flourishes in Cape Colony up to elevations of 4,000 and 5,000 ft.

Its timber closely resembles that of Rostrata—of a deep red colour, very hard and durable, but seasoning badly.

In Eastern Australia it is an abundant and widely spread tree extending from the winter and mixed rains of the south to the purely summer rains of the semi-tropics. It occurs near the coast and on the mountains and plateaux some distance inland. As an introduced tree it flourishes on the burning plains of North India, and withstands the icy blasts of a Stormberg winter in S. Africa. It is thus an exceedingly useful tree for S. Africa with its wide extent of fairly watered plateau country, such as the Eastern Districts of Cape Colony, the Free State, Transvaal and perhaps Bechuanaland.

The flower, cones, and seed of this tree are the same as those of the Rostrata Gum. Unsifted seed averages 1,412 to the ounce.

Eucalyptus viminalis. WILLOW GUM.

Frost-resistant and a free grower, but the wood is not one of the best of the Eucalypts. Its durability is doubtful and it is almost always unsound at the heart. It is closely allied botanically and often alike in appearance to *E. rostrata.* The early leaves are, however, very different:

long, narrow, straight, *stalkless*, and arranged in opposite pairs. This is the so-called Willow-gum of Dordrecht and the Stormberg, where it is said to be the only Eucalypt that can stand the cold there. In Tasmania it attains giant size. Unsifted seed averages 15,800 to the ounce.

Ficus capensis. **CAPE FIG.**

A good-sized tree, indigenous in the warm lower forests at Knysna and the Amatolas. In tropical countries various species of figs are commonly employed for road-side planting. They succeed better than most trees on dry stony ground, and afford an ample and dense shade. They are propagated by simply planting a stake in the ground, watering, and protecting by a mud wall or otherwise. When once rooted they are able to withstand the most intense drought and heat. In a nursery, fig trees are raised easily from layers and cuttings; with difficulty from seed.

Ficus elastica. **INDIA-RUBBER FIG.**

Will only grow in warm, moist situations, and it will only yield rubber in its home in the steamy tropical forests of Assam. Even in Assam and other tropical countries where it grows to a large handsome tree, if planted outside its native forest it yields no rubber. It would be useless therefore to plant, as has been proposed, the India-rubber tree in Cape Colony for the sake of getting rubber.

Ficus macrophylla. **MORETON BAY FIG.**

Several species of fig tree (not the eating fig, *Ficus carrica*), have been planted in Cape Colony for shade. Of these the Moreton Bay fig is the best known. It succeeds well at Port Elizabeth and elsewhere near the coast. It is very like the India-rubber tree *Ficus elastica*, but has a somewhat larger leaf, less rough and brownish underneath. The difference between these two trees should be noted as they are often sold the one for the other, and the Australian tree is the hardier and better one for planting.

Ficus natalense. **NATAL FIG.**

This is a handsome tree affording a dense shade that has been successfully planted in the streets of Cape Town. It resists the South-easters well.

Fraxinus americana. **AMERICAN ASH.**

A leaf-shedder. This promises better than the European ash, but it is as yet too early to say how it will succeed. A valuable tree. 1,040 seeds go to the ounce.

Fraxinus excelsior. **EUROPEAN ASH.**

A leaf-shedder. Ash seed does not germinate easily. In Europe it is usual to "stratify" the seed, *i.e.*, pack it in moist sand till it starts germinating. In Cape Colony I have found this plan to succeed well, but that the germination is equally good if the seed be sown in beds early in winter. There is a considerable plantation of the various Ashes at Tokai and at Ceres Road, but all as yet show a rather poor growth. It is very desirable to grow Ash in Cape Colony since there is no other elastic wood like Ash or Hickory, and a considerable quantity of both these is imported. Ash requires in Europe a damp situation and a clayey soil. 1 ounce of seed averages 472.

Fraxinus excelsior var. Kabylia. **KABYL ASH.**

A leaf-shedder. The Algerian Ash promises well on Table Mountain and at Clanwilliam. At Tokai the growth has been slow. In the mountains of Algeria it grows with great vigour and is used for a variety of purposes by the industrious Kabyl peasants. It seems more likely to succeed in South Africa than the European variety. If sown early in winter its seed will germinate in great part the first spring, the rest the following spring. The seedlings should be transplanted and treated generally as described under Oak. 1,650 seeds go to the ounce.

Grevillea robusta. **SILK-OAK.**

A medium-sized tree with pretty fern-like leaves and brilliant yellow flowers It has a useful but not durable timber, that is prettily marked in specimens that are cut, or split, parallel to the medullary rays. A native of the warmer eastern coast of extra-tropical Australia. It will not grow in the colder parts of Cape Colony, but succeeds fairly in the warmer. It prefers summer watering or rain as in the E. of the Colony. Easily raised from seed like the Gums. It grows well in S. India, lat: 12 deg. N., and 3,000 ft. elevation, mean temp. 10 deg. above that of Cape Colony, so that this tree would probably succeed in Mashonaland and the plateaux of the interior. 1 ounce of clean seed averages 4,580 grains.

Hakea suaveolens. **THE COMMON HAKEA.**

Completely naturalized and the commonest of all hedge plants in the Cape Peninsula. It is very hardy there, and may be clipt to any size, though it is perhaps best adapted to high hedges and tall wind screens. It rapidly forms an impenetrable hedge. Cattle will not eat it. It does not stand the frost of up-country. It takes 6 muids of cones to make 1 lb. of seed. 1 ounce of unsifted seed averages 1,814 grains.

Hakea gibbosa. **THE PRICKLY HAKEA.**

Indigenous or naturalized, this species is common on the slopes of Table Mountain. It makes a less dense but more prickly hedge than the common Australian Hakea.

Harpephyllum cafrum. **KAFRE-PLUM or DOG-PLUM.**

Of indigenous trees this is one of the most desirable to plant, it being hardier and faster-growing than most of the native trees. The young plants with their large, glossy, dark-green, sickle-shaped leaves, the shoots tipped red, are

very handsome, and are raised by nurserymen as ornamental shrubs both at the Cape and in English glass-houses. The Kafre-plum may be propagated either by sowing the fruit—the plum, or by putting in stakes 3 in. to 5 in. thick and 6 ft. to 8 ft. high. The plums should be sown in tins, and at the end of two years will produce plants 2 to 3 ft. high. The stakes grow like willow stakes when planted in the ground.

The Kafre-plum is a large timber tree of the Eastern forests, with an eatable plum and a useful wood that is almost indistinguishable from mahogany. Like mahogany, it requires careful seasoning. The plums average 78 to the pound.

Similar in appearance to the Kafre-plum is another indigenous tree, Essen wood (*Ekebergia Capensis*). This is less hardy and less ornamental than Kafre-plum—the leaf thinner, and of a dull, light green.

Juglans nigra. BLACK WALNUT.

A leaf-shedder like the common Walnut, but with an inferior nut. It is rarely a good tree in South Africa and seems to require a cool damp climate. Grows well at Kew. In its native home it has a wide range extending from the borders of Canada into the tropics. In our forest nurseries it has a longer fall of the leaf than any tree with which I am acquainted. It is no use planting this tree on poor ground or in dry warm localities. 1 pound averages 37 nuts.

Juglans regia. COMMON WALNUT.

A leaf-shedder. A tree, valuable for its timber and nuts, that should be planted more frequently than it is. This tree does not succeed in the climate or soils of the coast. At 3,000 or 4,000 ft. and on the Karoo limestone fine trees bearing heavily are common. To raise trees take off the green rind from the fresh nuts and sow *at once* like

acorns in prepared beds. A light covering of straw or fern will protect from the frost any nuts that may germinate during the winter. Another plan is to pack the seed in sacks or boxes during the winter, taking the precaution to mix with the nuts double their bulk of dry earth. Keep in a cool place and sow next Spring (or earlier if germination sets in). Treat afterwards in the same way as described for Oaks.

Juglans Sieboldiana. **JAPANESE WALNUT.**

This may be tried at lower elevations near the coast and in non-limestone soil, where the common Walnut fails.

Juniperus bermudiana. **PENCIL CEDAR of Bermuda.**

Quite as valuable as the American tree, and better adapted to the coast districts of the Colony, where it rapidly runs up to a straight tall tree with a growth about two-thirds that of the Cluster-pine. It is one of the largest trees in the Botanic Gardens at Cape Town. Its growth there is decidedly more vigorous than that of *Juniperus virginiana.* The wood of this tree is indistinguishable from the Pencil-cedar of commerce. In the Bermuda Islands the Cedar and its scented wood are met with everywhere: it is the only tree that attains any size. Its natural reproduction is described as being good. There are no mountains in the Bermudas, but Baron F. von Mueller states that it grows up to 6,000 ft. on the mountains of Jamaica. Succeeds at Johannesburg. In Bermuda the wood is considered imperishable, and there are boats built of it nearly one hundred years ago without an unsound plank in them. The climate of Bermuda is semi-tropical and warmer than any part of Cape Colony. It has a moderate rainfall but damp winds that blow across the Gulf Stream loaded with moisture. 410 berries containing 920 seeds of *J. bermudiana* go to the ounce.

Juniperus virginiana. **PENCIL CEDAR of North America.**

A native of North America, where it is widely distributed. Will probably prove hardy over wide areas in Cape

Colony. Hardy but slow-growing in the Cape Peninsula. Its bushy growth, too, is against its extended planting there. In the drier districts it seems a tree of great promise. In the Robertson plantation, where the drought, brak and violent winds are very trying, it has proved to be absolutely the hardiest tree. At Hanover, where in 1898 there was 23° of frost, no tree yet tried there has proved so hardy. A very valuable tree, yielding the fragrant wood of the familiar lead-pencil. The wood is soft and easily worked, but extremely durable, indoors or out-of-doors; in fact it may be used (and is used in America) for almost every purpose, from a lead-pencil to a gate-post. Baron von Faber, the great pencil manufacturer, pays 10s. per cubic foot for his wood in America, and the forests are becoming rapidly exhausted—*vide* pages 36-37, "Journal of a Forest Tour." The Pencil-cedar is a rather slow-growing tree—less than one-half the growth of the Cluster-pine in the Cape Peninsula; but no tree-planter in South Africa should neglect to try, thoroughly and repeatedly, this most valuable tree. The Pencil-cedar may advantageously be planted alternately with the Jerusalem-pine. The thinnings will then cut out the less valuable species. 1,270 dry berries containing 1,340 seeds go to the ounce of *J. virginiana.*

The two Pencil-cedar trees seem to merit the attention of tree-planters almost above all others. Their germination is slow but their after treatment in the nurseries easy. The seed should be sown in early winter. There will then be a fair germination the following spring. The rest of the seed will come up the succeeding spring or 18 months after being sown. They may be pricked out into tins or beds. They make good fibrous roots and plant out easily, more especially the Virginian Pencil Cedar.

Laurus (Cinammomum) camphora. **CAMPHOR TREE.**

The natural climatic limits of the Camphor tree may be taken as lying between the mountains of Japan and the Island of Formosa, where the climate is tropical and similar to Hong-Kong. It succeeds fairly in Southern Europe, and

very well on tropical mountains; but is out of place in the cold, dry situations, where it has often been planted in S. Africa. In cold localities it is a partial leaf-shedder. The wood commands a ready sale, and is a favourite one with cabinet-makers, on account of its easy working and its scent of camphor. Camphor wood is durable for some years, but as the camphor evaporates the wood is liable to be attacked by insects. Camphor may be distilled from all parts of the tree. There are some fine old Camphor trees at Somerset West, near Cape Town. It seems also to succeed at Knysna. The seed will not keep long, and should be preserved by being mixed with sand. Its extended culture is desirable in those parts of the Colony where it thrives. The key to the successful cultivation of the Camphor tree lies in a fact which I have recently observed. The Camphor tree is strongly shade-bearing. It is the most shade-bearing of all the Exotic timber trees hitherto introduced to S. Africa. It is as shade-bearing as Stinkwood, Sneezewood, Assegai, and others of the very shade-bearing species found in the indigenous evergreen forest of the southern coast of Cape Colony. The Camphor tree is probably thus destined to play an important part in the restoration and improvement of the indigenous forests.

Leptospermum laevigatum. **AUSTRALIAN MYRTLE.**

The favourite hedge for garden purposes in the Cape Peninsula. None other is so neat or so graceful when not kept closely clipt, though it never forms an impenetrable fence like Hakea or Pomegranate or Kei-apple. It is seen at its best clipt into a low triangular hedge. It is perfectly hardy on the poorest sandy soil. As will be seen from the botanical name, this tree has no connection with the real Myrtle. Easily raised from seed like a Gum. If left to itself it runs into a small straggling tree 25 to 30 ft. high. It seeds profusely and is completely naturalized in the old Government plantations on the Cape Flats. 1 oz. of clean seed averages 96,000 grains.

Leucadendron argenteum. **SILVER TREE.**

Indigenous to the mountain slopes of the Cape Peninsula and neighbourhood, where it forms scattered woods of medium sized trees, the glistening sheen of its white leaves contrasting beautifully with the dark foliage of the intrusive Pines. Raised easily from seed, but liable to fail in the nursery unless kept dry during summer. Too much moisture and heat are common causes of failure in English glass houses. It is cultivated successfully in various parts of the Colony where the climate is cool and mild. It rarely lives long away from the Cape Peninsula. It delights in the violent S.E. winds that sweep the slopes of Table Mountain. One ounce of clean seed averages 136 grains.

Ligustrum japonicum. **JAPANESE PRIVET.**

This forms a rapid growing dense hedge and one that is valuable in the interior for its frost-resistant properties.

Lycium horridum. **BOXTHORN.**

Makes a strong hedge which stands drought and partial shade, but requires a good soil.

The Boxthorn grows also freely by the sea-shore, and there becomes leafless during the height of the South-easters, its fresh green foliage and red berries appearing with the first winter rains. It makes a strong impenetrable but somewhat unsightly hedge when bare of foliage in summer. 1 ounce of clean seed averages 12,160 grains.

Melia Azedarach. **SYRINGA.**

A leaf-shedder. A hardy tree with a dark heart-wood, and clusters of sweetly scented flowers resembling the English Lilac: hence the Colonial name of Syringa. It is cultivated throughout S. Africa and will grow with little water in the warmer parts of the Karoo. About Cape Town and the cooler portions of the Colony the foliage is scanty and the tree of poor growth. In localities with a

warmer summer, such as Clanwilliam, the foliage is dense and the growth of the tree vigorous. It seeds profusely (too profusely for tidiness in gardens) and is easily raised from either seed or cuttings. The latter may be of any size. Wood: hard, dark-grained and pretty, but too small for timber.

Mimusops obovata. **MILKWOOD.**

An indigenous coast tree with a durable wood, but too slow-growing to be planted with profit. Seed abundant and easily obtainable. Might be utilized for sand-drifts where the movement of the sand had been arrested by more fast-growing species.

Morus alba. **WHITE MULBERRY.**

A leaf-shedder. If a cheap, very quick-growing shelter hedge is required put in cuttings of White-mulberry during the winter or early spring. The watering during the first summer is the only trouble required. White-mulberry grows quicker than any hedge plant and thus requires frequent clipping. If left to grow into long shoots, these will be easily broken by the wind.

This tree is the proper food of the silkworm. The value of silk—more than its weight in silver, should tempt people to further experiments in silk culture. Nothing in Cape Colony is easier to produce than mulberry leaves.

Myoporum insulare. **MANOTOKA.**

Wind-resistant: on the sea-shore it is only the most violent south-easters that destroy its light green tender-looking foliage. Largely planted for shelter at Sea Point and in the Cape Peninsula where it grows to a small bushy tree, 20-25 ft. high. Flourishes at Robertson and elsewhere in S. Africa at places not too far from the coast. A strong vigorous grower, delighting in a sandy soil; unsurpassed for high hedges and wind-screens. It is a partial shade-bearer and carries dense foliage. It is a

native of S. W. Australia, whence it extends along the southern and eastern coast under slightly different forms. It is propagated from seed and cuttings. The long branches sometimes root themselves where they rest on the sand. The cuttings should be put in with the first winter rains, in the south-west. It flowers in the middle of winter.

Myrica cordifolia. **WAXBERRY BUSH.**

The most valuable indigenous sand-binding bush on the S.W. coast. The branches take the form of runners and root themselves wherever they rest on the sand. The seed is collected on a large scale by the Forest Department for use in the fixation of sand drifts, where it is sown along with Wattles. The wax melts at a higher temperature than bee's wax, and advantage is taken of this property in making candles for carriages and bicycle lamps. 340 berries go to the ounce.

Nuxia floribunda. **VLIER.**

The most ornamental tree in the Knysna forests. It has a dark-green, laurel-like leaf, and about the middle of May becomes covered with rich masses of sweetly-scented cream-coloured flowers that render portions of the forest a veritable fairy scene. This beautiful tree is rarely found outside the Knysna forests, but is well worthy of cultivation in sheltered damp localities. Raised from seed; requires shade, shelter, and moisture like the other indigenous trees. Like them also it is slow-growing. It has a wood not of much use, but which seasons well and has been employed with success in cart-making.

Ocotea bullata. **STINKWOOD.**

The most valuable tree of the indigenous dense evergreen forest. Requires damp air and shade. Is best raised like ferns. Seed very difficult to obtain good. It often germinates or contains a grub before it falls to the ground. Stinkwood only flourishes in moist sheltered situations.

Growth not so slow as most of the other indigenous trees. It is rarely planted, but the number of trees in the forest is increased by special cultural operations in their favour. Stinkwood has been justly termed the Oak of South Africa. It is chiefly used in the Colony for wagon and cart building. The choicest and most expensive furniture is also made from it. The demand for this wood is greater than the supply. It coppices admirably and plantations of it would be very valuable if they could be formed.

Olea Europaea. **THE CULTIVATED OLIVE.**

The cultivation of the Olive tree presents no real difficulty in S. Africa, given a good soil and rainfall or irrigation. The cultivated kinds will naturally not grow uncared for. Drought or weeds soon destroy them, as many have found. The Olive, though it can be raised from seed, is more usually propagated from cuttings or from suckers. Olive oil has been so much superseded lately by cotton seed and other cheap oils that Olive culture is now less profitable than it was. The finest Olive trees I have seen in the Colony are at Cradock; but it is to be found here and there on farms all over the South-western Divisions—very little cared for and sometimes ignorantly rooted up for firewood. Such trees bear well, but the fruit is put to no use. There are several species of wild Olive indigenous to S. Africa. The European Olive has been grafted on to most of these. Mr. Fox, the Field-cornet of Still Bay, has a grove of grafted trees. Should Olive oil again rise in price, the tree would doubtless be more largely cultivated; but, as was remarked in speaking of the Cork-oak, its cultivation should be begun cautiously. The Olive thrives best on soils which contain lime. The early Dutch Governors made repeated, though unsuccessful, attempts to introduce the general culture of the Olive into Cape Colony. The smaller indigenous Olives yield durable fencing posts, by some considered as durable as Sneezewood. *Olea laurifolia*, or Black Iron-wood, is a large timber tree of the moist evergreen forests; but the wood, though very hard, is not durable, and it is hardly worth the serious attention of the tree-planter.

Phytolacca dioica. **BELHAMBRA.**

A partial leaf shedder. This tree has been extravagantly puffed for sale purposes. It is a semi-tropical tree, and rarely does well in the Colony, where at best it is an unshapely mass of green with a stem like a cabbage stalk. Wood and fruit worthless. In the semi-tropical interior it might perhaps furnish a quick-growing, shady tree.

THE PINES.

These should be sown *in situ* (where they are to grow) whenever possible. But only Cluster-pine is sown *in situ* on any large scale in Cape Colony. Pines can hardly be sown too thickly. Most Pine seeds are greedily eaten by birds and mice. If seed be expensive, or the locality hard to plant, nursery plants must be resorted to. Nursery Pines are raised in beds or boxes as indicated for Gums. Pines do best in the sandy soils and mild climates of the S.W. districts. Pines may be transplanted with open roots (like cabbages) from nursery beds in the S.W. districts, where there are certain winter rains. Elsewhere, tin plants are usually safest. Only the Jerusalem-pine is hardy everywhere and able to stand the drought and heat of the plains of the interior. The Insignis-pine does best in cold damp mountainous districts, where also the Scotch-pine and Corsican-pine may be planted. The Cluster-pine is the forest tree of the Cape Peninsula and South. Nine-tenths of the wood used in the world, it has been computed, comes from the Pines or the Conifer family. Where Pines grow well the tree-planter should never lose sight of them, not only on account of their usefulness themselves, but for their value to mix with other trees and form close clean plantations.

Pinus australis. **PITCH-PINE.**

This is the true Pitch-pine of the Southern States of America, and thus a very valuable tree. It ought to thrive

well in Cape Colony, but great difficulty has been experienced in obtaining good seed, and the tree has not yet been properly tried. It is a tender tree, and while in the nursery must be carefully sheltered from frost. The appearance of the Pitch-pine wood that is imported indicates a slow-growing tree. It is the principal tree on the sandy "Pine Barrens" of Florida, where it occurs as a lofty tree, 60 feet and more to the first branches.

England pays nearly a million sterling yearly for imported turpentine and resin, the great part of which comes from this tree. The traveller Porcher calls it "one of the greatest gifts of God to man." 1 ounce of clean seed averages 390 grains.

Pinus canariensis. **CANARY ISLAND PINE.**

A native of the high desolate regions of Teneriffe, from 4,000 to 6,000 feet. It forms there a belt above the zone of evergreen forest, and in a scattered state extends to sea level. Its timber is highly prized for its durability, strength and good working qualities. It is known to have lasted in houses for three centuries. Its timber is highly spoken of at Madeira. Sir Joseph Hooker describes this pine as still existing in Morocco. It has only recently been grown on a large scale in Cape Colony. So far it seems quite hardy in the southern districts and at Knysna, though it prospers most in mountainous districts. In the Cape Peninsula it has a growth about half that of the Cluster-pine. It is easily recognized by the whitish blue appearance of the seedlings and the long leaves (needles) of the older trees. It is hardy in most parts of S. Africa, but especially at some elevation and it deserves the special attention of tree-planters, on account of the superiority of its timber, to that of all the other common naturalized pines. Clean seed averages 266 to the ounce.

Pinus halepensis. **JERUSALEM PINE.**

A native of S. Europe, Asia Minor and N. Africa. Hardy everywhere in S. Africa. If not planted close, 3 ft.

x 3 ft., the Jerusalem-pine will be little better than a bush. The wood is a coarse deal. It thrives best where there is lime in the soil. At Port Elizabeth it takes the place of the Cluster-pine at Cape Town. Indeed in S. Africa these two pines have the same natural distribution as in S. Europe where the Cluster-pine is the Western tree, the Jerusalem-pine the Eastern tree. Except in certain localities (probably where there is plenty of lime in the soil), the Jerusalem-pine grows about half as fast as the Cluster-pine of the Cape Peninsula. There is a group of well-grown trees with natural reproduction in Hof Street, near the top of the Avenue, at Cape Town. The Jerusalem-pine is easily recognised by its small cones, its scanty and open foliage, the smooth whitish bark of its young stems, and its bushy habit of growth. It is a tree of dry countries and unfortunately its light couvert renders Jerusalem-pine forest peculiarly liable to burn. It is not liked by Algerian Foresters for this reason. It should only be planted in localities too dry for better class pines. It yields a second-class timber similar to Cluster-pine. An ounce of Jerusalem-pine seed averages about 900 grains.

Pinus insignis. INSIGNIS PINE.

A quick-growing Pine producing nevertheless a fine deal that planes up with a good surface like the imported deals. It is a native of the Californian coast, and also, it is stated, of the lower mountains (Pinetum Brit). Fairly hardy in S. England I saw some fine trees of all ages in Devonshire. In the Cape Peninsula it is at first more fast growing than the Cluster-pine, but this position is soon reversed. At Tokai it is suffering to an increasing extent from a disease, seemingly the same as that which affects the Stone-pine so seriously in the Cape Peninsula. In the Natal plantations the Insignis-pine dies off from another disease. Though a native of California where the summer droughts are severe, the Insignis-pine both in Australia and in S. Africa succeeds best where the summer droughts are emitigated by some elevation on the mountains. In th moist Knysna climate it thrives better than in the Cape

Peninsula and seems to grow as fast as the Cluster-pine. The Insignis-pine cannot stand severe drought, and for this reason probably its growth is often uncertain and disappointing. But, in cold, damp, mountainous localities, it is the best of all the Pines and grows into the noble tree of the Nilgiri Mountains in S. India, and of the cooler portions of Australia and of New Zealand. Clean seed averages 1,212 to the ounce.

Pinus Laricio. **CORSICAN PINE.**

A tree of the mountains of S. Europe where it grows above the Cluster-pine and forms valuable forests remarkable for their fine clean boles. Among several forms the Black Austrian Pine is a less well-shaped variety that extends down to the plains. This has been largely used for planting in dry, gravelly, and calcareous soils in France, but *not* in sandy soil.

The Corsican Pine does not succeed in the Cape Peninsula but might be of great value in situations better adapted to its wants. While at Kew in England it is the largest and best growing pine, my experience of it so far in Cape Colony is exactly the reverse. Clean seed averages 2,080 to the ounce.

Pinus pinaster, **CLUSTER-PINE**—**Mannetje Danne boom.**

A native of S. Europe, common in Corsica, rare in Algeria. Generally found near the coast, but ascending the mountains as high as 4,000 ft. in Spain. It extends along the whole Mediterranean seaboard, but the largest forests and the loftiest trees are in S. W. Europe. Its distribution is the inverse of the Jerusalem-pine, that tree being abundant on the Eastern side of S. Europe and rare on the Western. In Cape Colony these two Pines have a similar liking for East and West. In the South-western districts Cluster-pine is by far the most vigorous grower of any Pine. It and the Stone-pine form the beautiful pine woods of the Cape Peninsula. It is the wonderful tree that has transformed the sand-wastes of Gascony in the S.W. of France, where it has been planted more largely than any other

forest tree in the world. Even in California, on account of its hardiness and rapidity of growth, it is preferred, in plantations, to Redwood and the other valuable native conifers. In the Cape Peninsula it grows rapidly and vigorously and is the principal forest tree of the country. Average increment from 100 to 300 cubic ft. per acre per year. The maximum acre increment obtained from a 14 year plantation at Plumstead is 341 cubic ft., or almost exactly half the maximum acre increment obtained from the Blue-gum on the Nilgiris. It reproduces itself abundantly from self-sown seedings, and forms a well-shaped tree and useful coarse timber in spite of the unskilful treatment to which it is usually subjected. Isolated trees produce very coarse knotty wood; trees in close plantations the reverse. Properly grown and injected timber could be used, as it is in France, for railway sleepers, paving blocks, and almost every purpose, except fine carpentry. The seed if well stored keeps good for three or four years. The Forest Department propagates Cluster-pine more largely than any other tree. From 6 to 8 tons of seed are used yearly in the Western Conservancy, chiefly on the Cape Flats. On account of birds, mice, and excessive wet it is necessary to employ as much as 40 or 50 pounds of seed to the acre. Though the ground is cold and wet in autumn it is more so in spring while late spring is followed too soon by the drought of summer. Midwinter sowings rot in the ground. Early autumn sowings give decidedly the best results. The rule in the Forest Department is to begin sowings in the Cape Peninsula with the first good rains after the middle of April.

The natural reproduction of Cluster-pine in the South Western districts of Cape Colony is as strong as that of the Scotch pine in England. In the Cape Peninsula the Cluster-pine woods re-sow themselves naturally and tend to extend in every direction. At Genadendahl the Cluster-pine may be seen conquering the strong veld vegetation and spreading itself up the mountain side. C. hamiltoni is a variety of Cluster-pine—a larger, finer tree than the common Cluster-pine. An ounce of clean Cluster-pine seed averages 725 grains.

Pinus pinea. **STONE PINE—Wijfje Danne boom.**

This is one of the two Pines that are naturalized and grow spontaneously almost everywhere in the Cape Peninsula. Do not plant it except for the edible nut; otherwise for practical purposes it may be looked upon as an inferior variety of Cluster-pine, being subject to a fungoid disease that destroys the terminal shoots and greatly injures the whole crown. It is the well-known "Umbrella-pine" of Italian scenery and pictures. Common along the sandy coast of Italy where, as here, it is often found growing with the Cluster-pine. In S. Italy and Sicily it ascends the mountains to 2,000 feet elevation. It is largely grown there as a fruit tree, the paper-shell variety being the favourite. The Stone-pine is somewhat more durable in the ground than the Cluster-pine, but for practical purposes neither should be used out of doors unless creosoted. These two Pines grow so much together and have such a different value that it becomes important to distinguish them. Many people fail to do so.

Cluster-pine.	*Stone-pine.*
Cones: Long-shaped.	Cones: When ripe, a large round ball.
Seed: Small and winged.	Seed: An edible nut or stone.
Leaves or needles: Long.	Leaves or needles: Less long.
Seed-leaves: Green.	Seed-leaves: Bluish-white.
Growth: Rapid.	Growth: Often not much more than half that of the Cluster-pine.
	Old trees: Umbrella-shaped.

An ounce of seed contains about 40 nuts.

Pinus rigida. **PITCH-PINE.**

This is the so-called Pitch-pine of the Northern States of America. This tree is cultivated in the Government plantations, but is hardly likely to prove a successful introduction except at a considerable elevation. It promises well on Table Mountain at 2,500 feet elevation.

Pinus sylvestris. **SCOTCH PINE.**

This is the great forest Pine of Europe. It extends over vast areas—from England to Siberia, and from the extreme North of Europe *to the mountains* of S. Europe. Its most southerly limit is at 5,000 to 6,000 feet on the Sierra-Nevada of Spain. In S. Europe the wood is coarse and not equal to that which reaches us in such large quantities from the Baltic ports, as Memel and red deal. The Scotch-pine succeeds fairly on Table Mountain where it has a growth about two-thirds that of the Cluster-pine. At lower elevations it is stunted and sickly. 1 ounce clean seed averages 4,340 seeds.

Pinus tuberculata. **KNOB-CONE PINE.**

Single specimens at Tokai seem to show a fair growth, but it has a coarse wood and bushy growth that does not invite extended cultivation. It is somewhat like the Cluster-pine in appearance. An ounce of clean seed averages 2,076 grains.

Platanus occidentalis. **PLANE.**

A leaf-shedder. A handsome tree, affording a dense shade, for which purpose it is largely grown as a roadside and avenue tree in Europe. A native of the Balkan Mountains, it succeeds best where the winters are cold, but it does very well at Madeira, and in the nurseries at Tokai and Knysna it grows faster than the Oak. Afterwards however it suffers more from wind than the Oak. It grows readily from slips about the size of a lead pencil, and rapidly forms a handsome and shapely tree. With a little care it can be raised from seed. Colonial seed is as good as any that can be imported. The Plane tree is somewhat susceptible to drought, but stands the summer of the Cape Peninsula and has there a growth nearly as vigorous as the Oak. But preferably it should be planted in cold damp places, or in towns where there is running water. There are some noble Plane trees in Madeira at 2,000 or 3,000 feet on the cool damp mountain side. It seems remarkable that this beautiful tree should for so

long have escaped the notice of Colonial tree-planters. It is scarcely worth growing for its timber which resembles, and is about as valuable as, the common Beech. 1 ounce of seed averages 9,200 grains.

Platanus orientalis. **PLANE.**

A leaf shedder. Similar to the above but with leaves smaller and more deeply lobed. These two species are so much alike that it is sometimes impossible to distinguish them. It would probably be more correct to regard them as varieties of the same species. *Vide* Mathieu's "Forest Flora."

Podocarpus elongata. **OUTENIQUA YELLOWWOOD.**
Podocarpus Thunbergii. **UPRIGHT YELLOWWOOD.**

In the indigenous forest the first of these two species attains huge dimensions, and together the two Yellowwoods yield nearly all the large timber that comes from the forests of the Colony. But both the Yellowwoods are so slow-growing that they have little interest for the tree-planter. Neither does the Yellowwood grow well away from the shelter and moisture of the forest. Yellowwood seed is easily obtained, and young trees raised. They require to be well sheltered when young, and for some years afterwards. In the indigenous forest there is generally a good natural reproduction of Yellowwood, which is fostered by the cultural operations of the Forest Department. There are some plantations of Yellowwood in Natal, but none in Cape Colony. 216 seeds or dry berries of Outeniqua Yellowwood go to the ounce.

Populus alba. **WHITE POPLAR.**

A leaf-shedder. Grows everywhere in S. Africa, but only forms marketable timber on good soil in damp situations where the winters are cold. On farms at an elevation of 4,000 to 6,000 feet trees with a clean bole of 60 feet are met with. At low elevations it runs to scrub and becomes

a nuisance. The best way to eradicate a Poplar scrub is to clean-cut and then knock off all green shoots as fast as they appear. This starves and kills the roots. Poplar is in large demand for match boxes, cheap furniture, and a variety of purposes, supplies from Colonial sources only partially meeting the demand. It should be more largely grown in suitable situations on upland farms. Poplar trees by their droppings rapidly improve the soil and usually keep it free from all other growth. The Poplar bush on farms is a feature throughout S. Africa, but the moisture requirements of Poplars set a limit to any large extent of cultivation. Raise from slips. 10,000 seeds to the ounce.

Populus fastigiata. **LOMBARDY POPLAR.**

A leaf shedder. The close upright variety of the Black Poplar. Often planted as a wind break; easy enough to rear from slips. In the Colony it rarely grows as lofty as in Europe.

Populus monilifera. **COTTON WOOD.**

A leaf-shedder. Common by the side of watercourses in America. On a rich soil and with plenty of water it grows faster than the common white Poplar. I have known instances in which it has grown even faster than the Blue-gum. Its wood is useful for the same purposes as other Poplar woods. Grows freely from slips.

Populus nigra. **BLACK POPLAR.**

A leaf-shedder. Usually less profitable to plant than the common Poplar, but generally hardy enough. Like the other Poplars it wants good damp soil, and grows easily from cuttings. It is liable, especially near the coast, to run to a thicket of thin short stems. This is what happens in the Knysna forest country.

Prunus amygdalus. **ALMOND.**

A leaf-shedder. Though usually a small fruit tree, the Almond will grow to the size of a timber tree under irrigation in the Karoo. It is easy everywhere to raise and transplant the young trees. Sow the stones fresh from the tree and most of them will come up the following spring.

Ptaeroxylon utile. **SNEEZEWOOD.**

This tree, Cape Cedar and Stinkwood are the three most valuable woods in the indigenous forests of South Africa. Shading and great care are required to propagate Stinkwood: sound seed is almost unobtainable. Sneezewood, however, is easily raised like Gums. It is confined naturally to the forests on the Eastern side of the Colony, but seems to succeed fairly as a planted tree at Tokai and at Ceres Road. Every effort should be made to propagate this very valuable tree. The wood, for durability, stands in the first rank, along with Jarrah and Greenheart, and is practically imperishable. It has been put in the ground like a stone, and dug out 50 years afterwards untouched by decay. 1 ounce of clean seed averages 2,650 grains.

Punica granatum. **POMEGRANATE.**

A leaf-shedder. A good strong hedge near the coast. Its dense vigorous growth renders it the best of all screens. On the Karoo and in the dry interior generally it is quite unsurpassed for beauty and shelter. It stands severe frost and considerable drought when once established. At Kenilworth, Kimberley, there is a remarkable Pomegranate hedge.

Pyrus Cydonia. **QUINCE.**

A leaf-shedder. The most generally useful and profitable of all hedge plants. Easily raised from slips, the only trouble being watering during the *first* summer. It soon grows into a strong hedge and bears fruit the third or fourth year. The quality of the fruit depends greatly on the soil and watering. The Quince hedges of the village of Robertson are famous. Cattle devour it greedily.

Quercus Cerris. **TURKEY OAK.**

A leaf-shedder. Raised exactly like the common Oak. It may do better in the colder districts; but, so far, in the forest nurseries and plantations near the coast it has not answered expectations. It seems to succeed well at Queenstown; and, perhaps, to stand frost and drought better than the common Oak.

Quercus pedunculata. **COMMON OAK.**

A leaf-shedder. Indigenous over the whole of Europe from Norway and St. Petersburg to Spain, Italy and Greece, but not in Algeria or N. Africa. A tree of the plains and valleys in Northern and Central Europe, and ascending the mountains to 4,000 feet in the south. In S. Africa the Oak is found at its best on well-watered mountains or within the region of winter rains. In the western and southern districts as far as Knysna, and elsewhere on well-watered mountains, the Cape Oak grows with a vigour probably equal to that of the Oak of S. Europe, and surpassing that of the Oak of N. Europe. The Cape Oak differs from the same tree in Europe (1), In its dense thick foliage: the covert of the Cape Oak is probably double that of the English Oak. (2) In its larger and more abundant acorns. There is nothing to prove that the Cape Oak in its timber or bark is inferior to the European Oak. Ninety-nine per cent. of the Oaks in the Colony are pollards, and therefore, of a necessity, unsound and misshapen.

The Oak exists as a hardy forest tree only on the wettest slopes of Table Mountain, on the cold Bokveld, in the Cedarberg country, and similar localities elsewhere. When planted in the open dry country round farms it is best treated as a fruit tree, *i.e.*, put into a deep rich soil and irrigated in the dry weather. The leaf droppings from Oak trees rapidly cause a rich forest soil, and the dense shade of the Oak usually kills down all vegetation beneath it. For this reason it has been proposed to plant lines of Oaks as fire breaks, but at Knysna and elsewhere it has been found to be not generally hardy enough for this purpose.

The Oak in Cape Colony is subject to a black canker that attacks the bark and cambium layer, and as soon as it has crept round the tree kills it. It is best treated by cutting out the diseased tissue as soon as it is observed and tarring, repeating the operation wherever the canker seems to be extending.

In Cape Colony the fall of the leaf is in the Oak short and somewhat uncertain. It has been remarked that those trees that are longest leafless usually bear the best crop of acorns. Care is necessary in collecting acorns for seed purposes. Rejecting the first that fall, seed acorns should be picked off the ground as soon as possible, mixed with sandy soil and stored in a dry place till Spring, or else sown at once. The latter plan is the best. Make a nursery ready, by digging and (in almost every case) manuring a piece of ground. Lay out drills about ten inches apart and sow the acorns close (about touching), in single lines. Weed between the lines by hand or with the American single-wheel cultivator (Messrs. Lloyds & Co., Burg Street, Cape Town). A simple method, and one that often succeeds quite as well, is to sow close and broadcast in small beds and trust to the young Oaks keeping down the weeds. In either case transplant out into lines during the first winter after sowing, spacing the young Oaks 5 inches in the lines and setting the lines 12 inches apart. They may stand thus for three or four years according to size of transplant required. Specially large and strong transplants are made by transplanting once or twice in the nursery and spacing the trees then 8″ x 18″. It takes 5 or 6 years to produce a full-grown Oak transplant 7 or 8 feet high. Transplants that are obtained by digging out young trees from existing woods are, as may be observed any day, of doubtful success. And the pollard tree produced by this method is never a sound tree. Such a tree after a lifetime of unskilful treatment at the hands of persons ignorant of the elements of forestry does not produce timber equal to that which is imported. But under skilful treatment there seems no reason to apprehend that the wood of the Cape oak would be inferior to the imported oak. Oak timber from different parts of Europe differs considerably and serves different purposes.

Cape oak wood is, as would be expected, more like that from S. Europe, which for most purposes is more valuable than the northern tree. It has been stated that the bark of the Cape oak contains only five or six per cent. of tannin, and is therefore useless for making leather; but it should be borne in mind that old bark from large trees in Europe contains no more tannin than this. The Oak-bark that produces the good leather of Europe comes mostly from coppice woods. While the young green bark of Oak is as rich as medium Wattle-bark (16 per cent.), the bark of old trees contains, according to Mathieu, only 4 per cent. of tannin.

Oaks should be planted during July or August as slender saplings 5 or 6 feet high, with a good ball of fibrous roots. They should, for this purpose, have been twice transplanted in the nursery. Any side branches that exist in the nursery tree should be taken off with a smooth cut close to the stem. When the planted tree shoots, rub off all side sprouts and allow only two or three branches at the crown of the tree during the first year. The second year is often the most trying for Oak transplants, so that the trees' store of food material should be husbanded for that year by checking a too exuberant growth during the first year. If necessary, water during the first summer.

The Oak in Europe is scarcely ever planted pure. It is usually mixed with Beech and more rarely Horn-beam or Pine. For this purpose the Canary Pine seems the best tree in the Colony—the Cluster-pine where is too fast growing.

Oak pruning is an art in itself. When branches have to be removed (either side branches on the stem or forking branches in the crown), the sooner they are taken off the better: large branches are always dangerous to meddle with, on account of the liability of the Oak to internal decay. Branches that have to be removed should be taken off close to the stem with a saw first and then pared smooth with a sharp knife. This should of course be done when the leaves are off in winter. The cut surface should always be painted over with coal tar. Take care not to strip the under bark when a limb is removed. 1 pound averages 97 acorns, and 1 muid sack of acorns 147 lbs.: say 15,000 acorns per muid.

Quercus suber. CORK TREE.

This is the tree that yields the cork of commerce. It is an evergreen Oak bearing acorns similar to the common Oak. Persistent efforts have been made to propagate and plant this valuable tree, but with somewhat varied success. Individual trees in well watered gardens grow well, but when large quantities are raised, numbers die off for no apparent reason; and the tree is rarely a strong grower.

In S. Africa it does not seem able to stand drought. The only really fine specimens are found at Claremont, &c., where there is a good rainfall or where they are well irrigated. An avenue of trees in the Worcester plantation about 30 ft. high is gradually dying off, it is difficult to say whether from drought or the attacks of the common black ant.

In Europe it grows on any soil, and from Gascony down to the extreme south of Europe (in a climate hotter than most parts of Cape Colony): it is found in abundance in the forests of North Africa. In the soft climate of Madeira it grows luxuriantly near sea-level, and it occurs on the high plateau of central Spain here the severe climate is the counterpart of our Karroo.

It ought to be hardy everywhere in Cape Colony, but is not; and tree-planters should go to work cautiously, planting a few trees here and there to see how it succeeds.

And this also should be remembered, that in Algeria there are enormous natural forests of Cork-oak that are gradually being put in order by the French Forest Department. When these Algerian Cork forests come into full bearing it will be hopeless to expect adequate returns from any Cork-oak plantation in S. Africa. The Cork-oak is an evergreen, and cannot be easily transplanted like the common Oak. It is raised like other evergreen trees from the acorns. 50 ordinary-sized acorns go to the lb.

Robinia pseudacacia. MOCK-ACACIA.

A leaf-shedder. This tree is cultivated in Europe for its Acacia-like appearance and its hard wood. Here near the

coast where Acacias are abundant and hard woods super-abundant, the Mock-acacia has little to recommend it except its free self-propagation from suckers and some durability of wood. The sucker shoots are useful for forest purposes, though inconvenient in a garden or park. In the Karoo its power of withstanding drought and severe frost render it invaluable. 1 ounce of seed averages 1,316 grains.

Rosa sp. ROSE.

Various kinds of hardy single roses make useful and beautiful hedgerows. Such hedges exist at Worcester, Stellenbosch, Clanwilliam, in the Botanic Gardens at Cape Town, and elsewhere. A rose hedge requires a rich soil and plenty of water. It will not flourish like the three common hedge plants—Australian-myrtle, Kei-apple and Hakea—on poor dry sandy soil, but its beauty should give it the preference wherever the soil is good and water abundant.

Salix sp. WILLOWS.

Leaf-shedders. Willows succeed almost everywhere in the Colony in damp situations, and provided the soil is not very poor (Zuurveldt).* They prefer running water. Nearly always grown from slips. Of Osiers (basket willows) there are several species growing in the Colony. Osier beds might be formed with profit on many farms, *vide* pages 101-102, "Journal of a Forest Tour." Only practical trial will settle which kind of Willow will produce good basket Osiers in any particular locality. We have an Osier that makes up into good baskets in the Government Plantation at Ceres Road and sample plots of all the best basket Osiers at Tokai. At Cape Town, Cane is the principal material used in making the better class of baskets. The Cane is imported from Calcutta for this purpose. The Weeping Willow will grow anywhere but best in the coldest districts. Then in times of drought it is lopped to feed the cattle.

Schinus molle. **PEPPER-TREE.**

Planted for scenic effect. It has graceful drooping branches, the foliage and stems smelling strongly of pepper. It grows badly in the western districts of the Colony unless watered. The warm moist summers of Knysna and the Eastern Districts suit it better. It grows best in a semi-tropical climate with a mean temperature of about 70° Fah. It is eminently a tree adapted to the summer rains and high temperatures of the interior, but it is remarkable that with a high summer temperature it will stand the severe frosts of Kimberley and the interior plateau country. It is a favorite in Bechuanaland. It has been largely planted as a street avenue tree in modern Athens. It is common on the Riviera and in Italy. It grows to a large tree in California and in the cooler parts of S. India. Clean seed averages 1,150 to the ounce.

Tamarix gallica. **TAMARISK.**

A leaf-shedder. The small tree with the beautiful, drooping, feathery foliage that will grow anywhere, but succeeds best in the Karoo and inland. It stands the severest frost and heat. It also stands the salt sea wind better than any other bush of its size. Wood only useful for firewood. It grows freely from slips.

Taxodium distichum. **BALD CYPRESS.**

A leaf-shedder, hence the common name. A native of the swamps of the Mississippi. Found also in wet parts of the Mexican plateau at 6,000 ft. elevation; and also, it is said, in China. The Mexican variety forms extensive forests. So far the cultivation of this tree has been disappointing. It may succeed in burnt forest at Knysna. There is a fine specimen in the Botanical Gardens at Cape Town. This is clayey vley ground. It seems to require a cold winter, a rich soil and plenty of moisture. It is of no use planting it on poor sour ground. The wood is a Cedar and is said to be almost imperishable. There are in the Colony many vleys that might be planted with this valuable tree.

Ulmus campestris. **ELM.**

A leaf-shedder. Most easily raised from suckers. In the S. W. districts it grows nearly as fast as the Oak, and furnishes a useful shade tree. It is also a good tree for the Karoo where it stands great heat, frost, and a certain amount of drought. Wood second-rate, white, close grained and useful for planks. This is the common hedge row tree —"the endless Elm of England."

INDEX.

BOTANICAL NAMES.

	PAGE.
Aberia caffra	21
Acacia cultriformis ..	24
„ cyclopis ..	26
„ decurrens ..	24
„ implexa ..	27
„ longifolia ..	27
„ lophantha ..	27
„ melanoxylon ..	27
„ pycnantha ..	28
„ saligna	30
Ailantus glandulosa ..	31
Alnus glutinosa ..	31
Araucaria excelsa ..	31
Bougainvillea, sp ..	32
Callitris arborea ..	32
„ cupresoides ..	33
Calodendron capense ..	33
Castanea vesca	33
Castanospermum australe	34
Casuarina equisetifolia ..	34
„ leptoclada ..	35
„ quadrivalis ..	35
„ tenuissima ..	35
„ torulosa ..	35
Catalpa speciosa ..	36
Cedrus deodara	36
Cedrela australis ..	36
Ceratonia Siliqua ..	37
Corylus Avellana ..	37
Cryptomeria japonica ..	37
Cupressus funebris ..	38
„ Goveniana ..	38
„ Lawsoniana ..	38
„ lusitanica ..	39
„ macrocarpa ..	39

	PAGE.
Cupressus sempervirens	39
„ sinensis ..	40
„ torulosa ..	41
Eucalyptus acmenoides	44
„ amygdalina	44
„ calophylla ..	45
„ capitellata ..	45
„ citriodora ..	45
„ coriacea ..	46
„ cornuta ..	46
„ corynocalyx	47
„ corymboso	47
„ crebra ..	47
„ diversicolor	48
„ ficifolia ..	48
„ globulus ..	48
„ goniocalyx	50
„ Gunnii ..	50
„ hemiphloia	51
„ leucoxylon	51
„ longifolia ..	51
„ macrorrhyncha	52
„ maculata ..	52
„ marginata ..	52
„ melanophloia	53
„ microcorys ..	53
„ microtheca ..	53
„ obliqua ..	53
„ paniculata ..	54
„ pilularis ..	54
„ polyanthema	54
„ propinqua ..	55
„ punctata ..	55
„ resinifera ..	55
„ robusta ..	55

	PAGE.
Eucalyptus rostrata ..	56
„ saligna ..	56
„ siderophloia	56
„ sideroxylon	57
„ stellulata ..	57
„ tereticornis	58
„ viminalis ..	58
Ficus capensis	59
„ elastica	59
„ macrophylla ..	59
„ natalense ..	60
Fraxinus americana ..	60
„ excelsior ..	60
„ „ var. kabylia	60
Grevillea robusta ..	61
Hakea suaveolens ..	61
„ gibbosa	61
Harpephyllum caffrum	61
Juglans nigra	62
„ regia	62
Juglans Sieboldiana ..	63
Juniperus bermudiana	63
„ virginiana	63
Laurus Cinnamomum Camphora.. ..	64
Leptospermum laevigatum	65
Leucadendron argenteum	66
Ligustrum japonicum ..	66
Lycium horridum ..	66
Melia Azedarach ..	66
Mimusops obovata ..	67
Morus alba	67
Myoporum insulare ..	67
Myrica cordifolia ..	68
Nuxia floribunda ..	68
Ocotea bullata	68
Olea europaea	69
Phytolacca dioica ..	70
Pinus Australis ..	70
„ canariensis ..	71
„ halepensis ..	72
„ insignis	72
„ laricio	73
„ pinaster	73
„ pinea	75
„ rigida	75
„ sylvestris ..	76
„ tuberculata ..	76
Platanus occidentalis ..	76
„ orientalis ..	77
Podocarpus elongata ..	77
Podocarpus Thunbergii	77
Populus alba	77
„ fastigiata ..	78
„ monilifera ..	78
„ nigra	78
Prunus amygdalus ..	79
Ptaeroxylon utile ..	79
Punica Granatum ..	79
Pyrus Cydonia	79
Quercus Cerris	80
„ pedunculata ..	80
„ suber	83
Robinia pseudacacia ..	83
Rosa sp.	84
Salix sp.	84
Schinus molle	85
Tamarix gallica ..	85
Taxodium distichum ..	85
Ulmus campestris ..	86

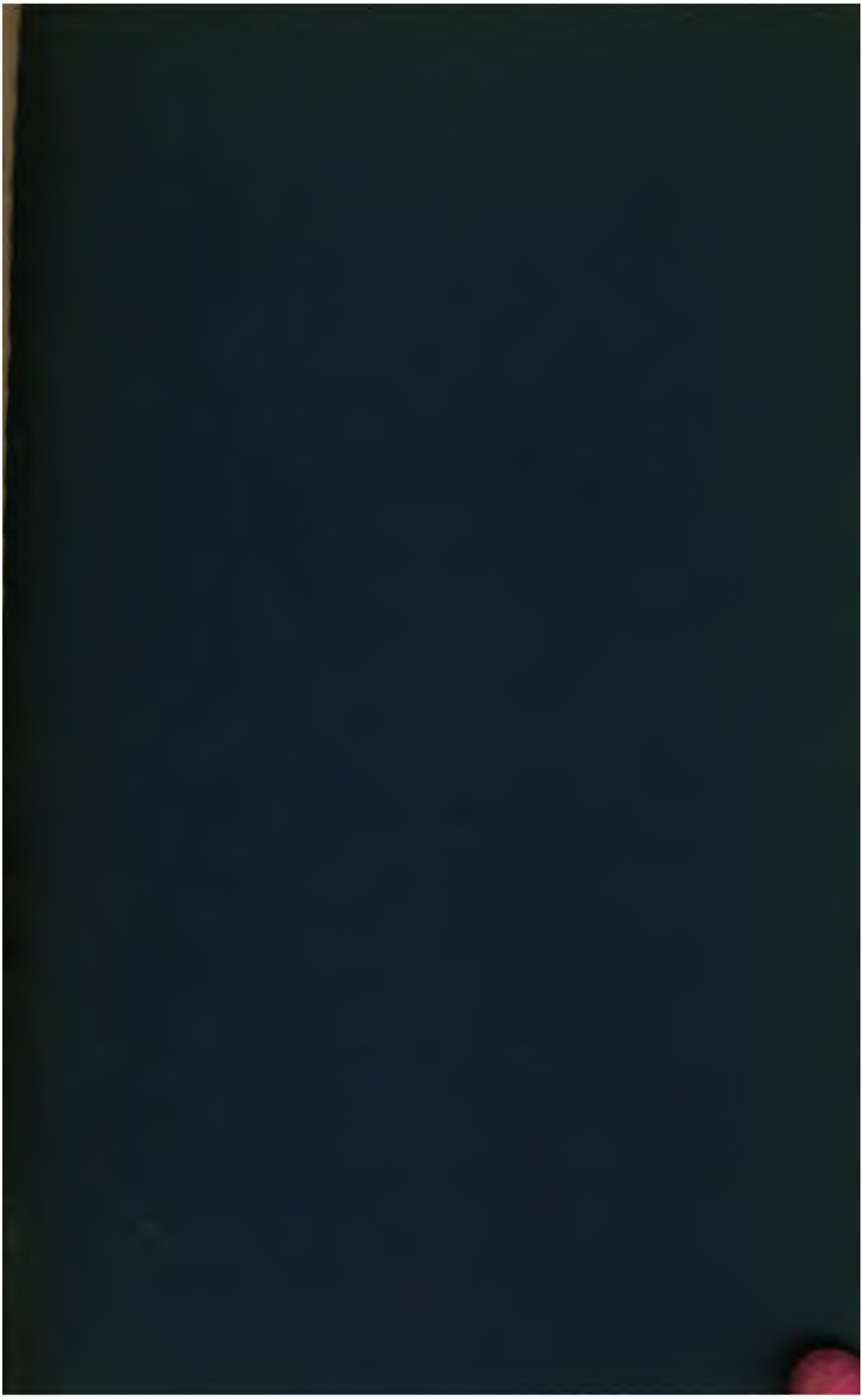
INDEX.

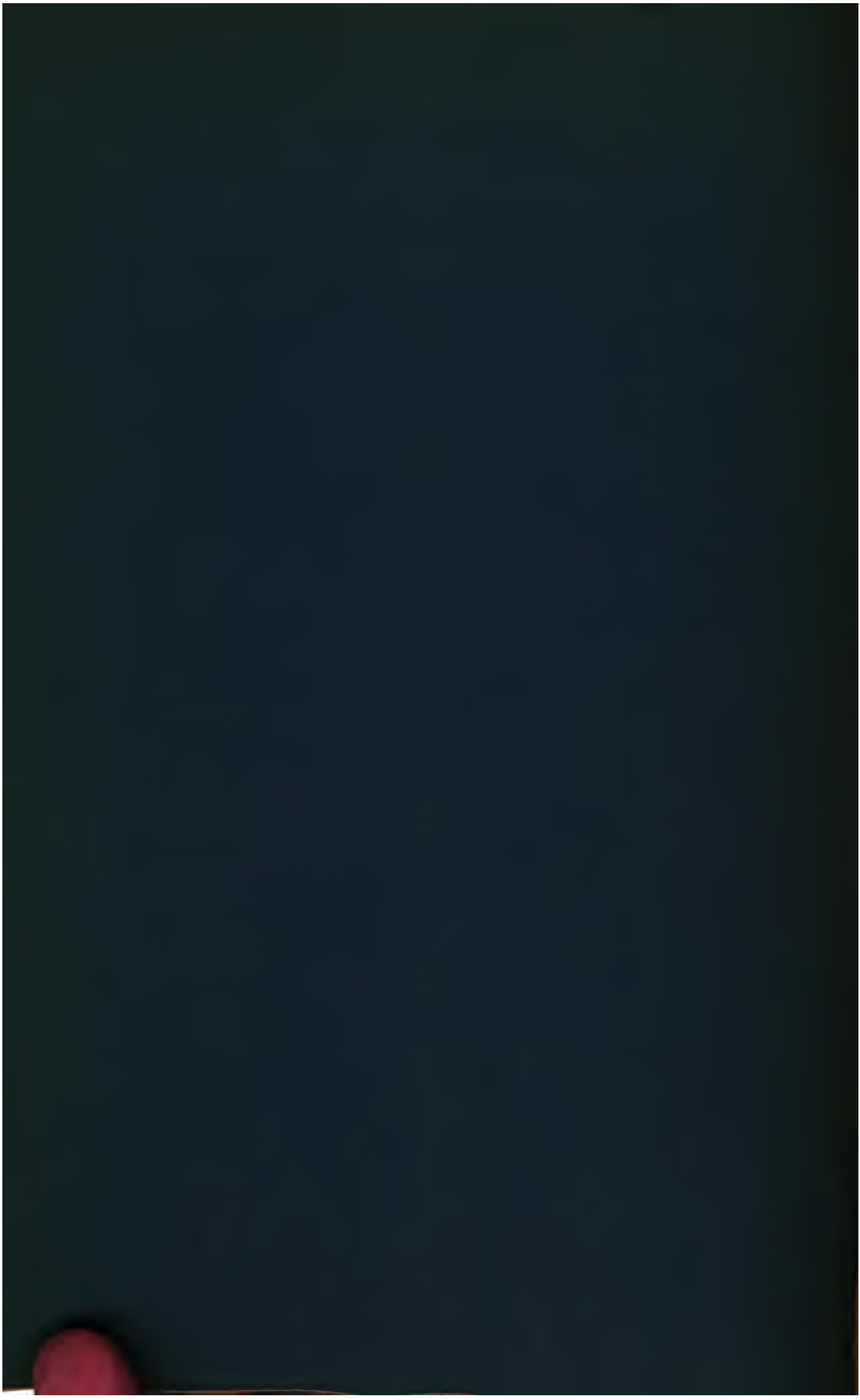
COMMON NAMES.

	PAGE.
Acacias	22
Ailanthus	31
Alder	31
Almond	79
Ash—Kabyl	60
„ —American	60
„ —European	60
Beefwood—Bushy	35
„ —Filao	34
„ —Straight	35
„ —Tenuissima	35
„ —Torulosa	35
Belhambra	70
Blackwood	27
Bougainvillea	32
Boxthorn	66
Camphor Tree	64
Carob	37
Catalpa	36
Cedar—Australian	36
„ —Clanwilliam	32
„ —Japanese	37
„ —Pencil — North American	63
„ —Pencil–Bermuda	63
Chestnut—Australian	34
„ —Cape	33
„ —European	33
Cork Tree	83
Cotton Wood	78
Cryptomeria	37
Cypress—Bald	85
„ —Berg	33
„ —Chinese	40
„ —Common	39
Cypress—Fragrant	38
„ —Goven's	38
„ —Lawson's	38
„ —Macrocarpa	39
„ —Portuguese	39
„ —Thibet	38
„ —Himalayan	41
Deodar	36
Dog-plum	61
Elm	86
Fig– Cape	59
„ —Indiarubber	59
„ —Moreton Bay	59
„ —Natal	60
Filberts—Common	37
Gums or Eucalypts	41
Gums—Bloodwood	47
Gum—Blue	48
„ —Calophylla	45
„ —Capitellata Stringy-bark	45
„ —Coriacea.	46
„ —Crimson-flowered	48
„ —Crebra Iron bark	47
„ —Flintwood	54
„ —Giant	44
„ —Goniocalyx	50
„ —Green	57
„ —Grey	55
„ —Grey Box	57
„ —Iron Bark	57
„ —Jarrah	52
„ —Karrie	48
„ —Lemon-scented	45
„ —Leucoxylon	51

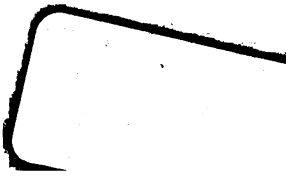
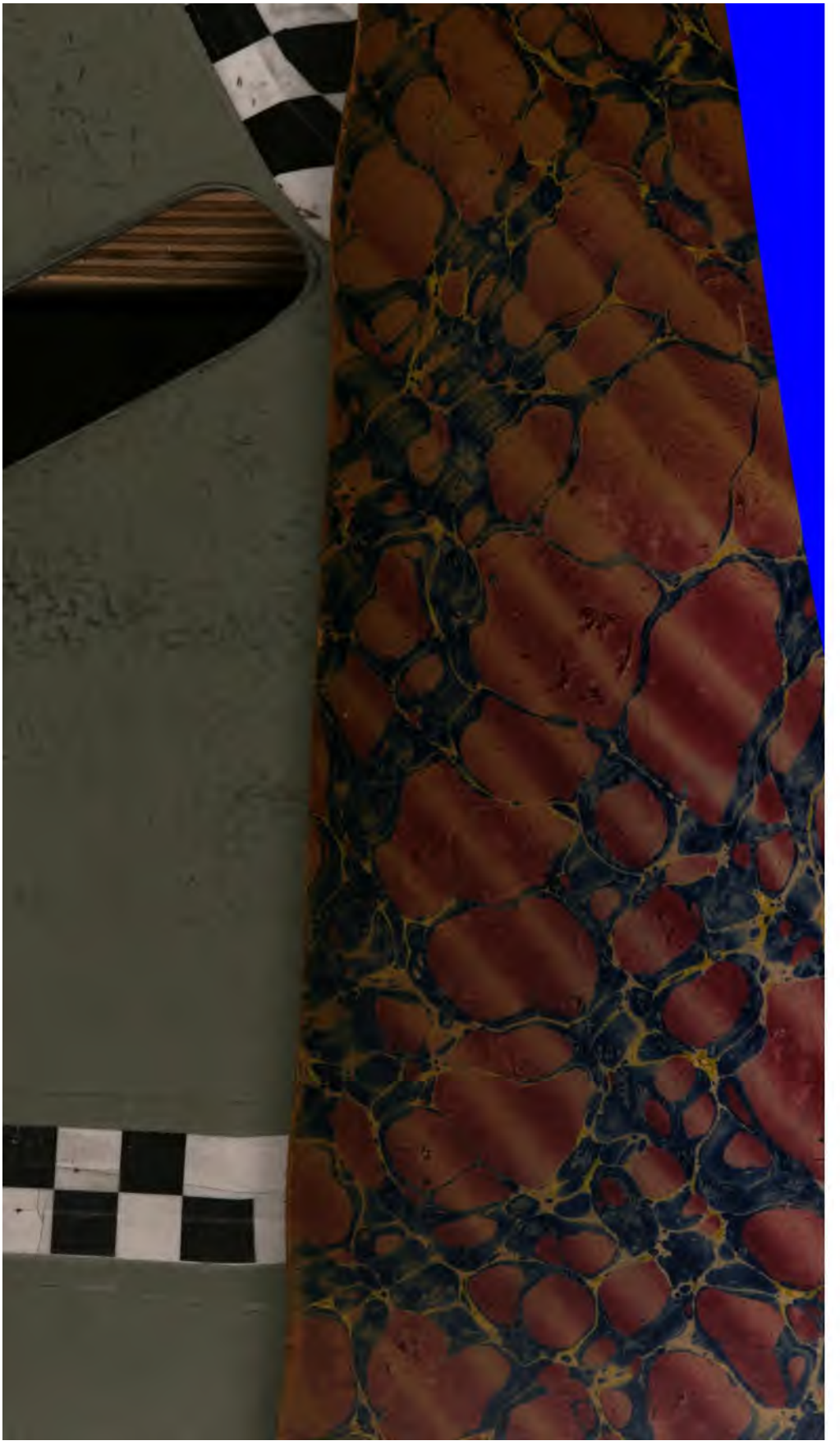
	PAGE.
Gum—Longifolia ..	51
„ —Macrorrhyncha	52
„ —Maculata ..	52
„ —Mahogany ..	55
„ —Melanophloia ..	53
„ —Microtheca ..	53
„ —Paniculata ..	54
„ —Polyanthema ..	54
„ —Punctata ..	55
„ —Resinifera ..	55
„ —Rostrata ..	56
„ —Saligna ..	56
„ —Siderophloia ..	56
„ —Sideroxylon ..	57
„ —Spotted	52
„ —Obliqua Stringy Bark	53
„ —Sugar	47
„ —Tallow-wood ..	53
„ —Tereticornis ..	57
„ —Yate	46
„ —White Mahogany	44
„ —Willow	58
Hakea—Common ..	61
„ —Prickly ..	61
Kafre-Plum or Dog-Plum	61
Kei Apple	21
Locust Tree	37
Manotoka	67
Milkwood	67
Mock-Acacia	83
Mulberry—White ..	67
Myrtle—Australian ..	65
Oak—Common ..	80
„ —Turkey	80
Olive—The Cultivated ..	69
Pepper Tree	85
Pines—The	70
Pine—Canary	71
„ —Cluster ..	73
„ —Corsican ..	73
„ —Insignis	72

	PAGE.
Pine—Jerusalem ..	72
„ —Knob-cone ..	76
„ —Mannetje Danne Boom ..	73
„ —Norfolk Island ..	31
„ —Pitch	70
„ —Scotch	76
„ —Stone	75
„ —Wijfje Danne Boom ..	75
Plane	76
Poplar—Black ..	78
„ —Lombardy ..	78
„ White	77
Privet—Japanese ..	66
Pomegranite	79
Quince	79
Robinia	83
Rose	84
Silk Oak	61
Silver-tree	66
Sneezewood	79
Stinkwood	68
Syringa	66
Tamarisk	85
Vlier	68
Walnut—Common ..	62
„ —Black ..	62
„ —Japanese ..	63
Wattle—Cultriformis ..	24
„ —Black ..	24
„ —Cyclopis ..	26
„ —Pycnantha ..	28
„ —Implexa ..	27
„ —Lophantha ..	27
„ —Longifolia ..	27
„ —Saligna ..	30
Waxberry Bush ..	68
Willows	84
Yellowood — Outeniqua	77
„ — Upright ..	77





3 2044 102 812 633



J. HOLZER
BINDER
BOSTON MASS